ELECTRICAL REVIEW

and WESTERN ELECTRICIAN with which is consolidated ELECTROCRAFT

VOL. LXIII, No. 4. CHICAGO, SATURDAY, JULY 26, 1913. ISSUED WEEKLY.

COMPRISING

ELECTRICAL REVIEW WESTERN ELECTRICIAN ELECTROCRAFT

ELECTRICAL REVIEW PUBLISHING COMPANY
608 SOUTH DEARBORN STREET
CHICAGO

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SUBSCRIPTIONS.

One Year, United States.....$3.00
One Year, Canada..... 4.00
One Year, Foreign Countries..... 6.00
Single Copy, 10 cents. Back numbers, beyond one month, each .25

Entered as second-class matter, November 7, 1908, at the Post Office at Chicago, Ill., under the Act of March 3, 1879.

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COST OF HYDROELECTRIC ENERGY.

The idea that electrical energy developed from water power is very cheap has been widely disseminated and to many minds the mere statement that energy is procured from such a source at once implies that the cost is low. While engineers who have had experience by actual contact with such projects know that the cost depends entirely upon the particular conditions in each individual case, the same idea haunts large numbers of engineers.

The operating expenses of a hydroelectric plant are obviously small, since the cost of fuel is eliminated, and this is the principal item of cost in the operation of a steam plant. Operating expenses, however, are not always the chief element of cost. Fixed charges sometimes constitute a more important element, and it is pretty generally true that they are higher for a hydroelectric development than for a station generating energy from steam. The extent to which the fixed charges influence the unit cost of energy depends largely upon the load-factor and is influenced by a number of other items, such as power-factor, relation of station capacity to the present load, etc. Where the load-factor is high and the fixed charges consequently distributed over a large number of energy units, the relative effect of the fixed charges is correspondingly small. With a low load-factor the reverse is the case.

In many instances of hydroelectric development it has been necessary to make an initial investment very much out of proportion to the immediate demand for power, in order to allow for the future development up to the capactiy permitted by the available water supply. It may not be possible to proportion the investment to the present demand on account of the limitations of design introduced by anticipated future developments. This condition frequently imposes a disproportionately large fixed charge in the early years of operation and may make the actual unit cost of energy unreasonably high.

It must be evident, then, that the cheapness of hydroelectric power depends entirely upon the conditions prevailing in any particular instance. With a high load-factor a hydroelectric development appears to its best advantage; whereas with a low load-factor the condition for steam operation is indicated. There are, no doubt, many cases where water power is available, but where it cannot be developed under the existing circumstances at as low a cost as the required energy may be supplied by steam. An in-

stance of this kind is presented in a case recently investigated by the Wisconsin Railroad Commission and reported on page 176. The Commission found that in the case of the Green Bay Gas & Electric Company the cost of operating a hydroelectric plant, when a fair allowance is made for depreciation, is greater than it usually costs to operate a steam plant under the same conditions. Although a complaint had been entered by the city alleging excessive charges, the Commission declined to decrease the earnings of the electric plant, although changes in the previous schedules were prescribed with the idea of making the charges more equitable and favoring a larger use of electric energy by the customers.

CO-OPERATION IN THE DEVELOPMENT OF THE ELECTRICAL INDUSTRY.

So much has been said regarding co-operation in the development of the electrical industry as opposed to destructive competitive methods, that one is inclined to believe with our good friend Rae that a lot of the co-operation we hear about is of the conversational character. It is hard, however, to move the leviathan, but a sincere and determined effort is being made, and through the organization of the Society for Electrical Development we are really organized to develop those plans for the harmonious up-building of the industry that will bring us nearer to definite results than anything we have tried heretofore.

Upon other pages of this issue there appears an article entitled "The Society for Electrical Development," by Mr. J. Robert Crouse. Beyond any possibility of doubt Mr. Crouse by temperament, by preparation and as a result of actual participation in the development of co-operative plans is eminently capable of discussing this question intelligently and altruistically. His analysis of conditions in the industry is worthy of careful consideration by everyone interested in its development, and it is to be hoped that our readers will study this message carefully and determine with courage and sincerity to co-operate to the extent of their possibilities in the movement he outlines.

A HINT IN SOLICITING POWER BUSINESS.

Solicitation of power customers can often be made very effective by pointing out poor engineering practice in the layout of the plant. It sometimes happens that enough mechanical improvements can be suggested along with the electric drive to win the case for the central station, regardless of the fact that there may be a slight margin in cost in favor of the old steam system, taking the winter heating problem into account. Correct mechanical design means more than at first appears.

There is no more important qualification in the central-station power solicitor's technical acquirements than the ability to locate and suggest remedies for inferior mechanical situations. It should not be forgotten that the labor cost of maintenance work tends to run excessively high in all poorly arranged mechanical installations. Wide opportunities to examine power reports demonstrate that in the detection of individual mechanical defects lies one of the most fertile means of securing additional electric service on the central-station basis.

THE OHIO ELECTRIC LIGHT ASSOCIATION.

The Ohio Electric Light Association has completed 18 years of active life, which has been marked by steady growth and an ever increasing importance to its members. The convention which was held last week at Cedar Point showed a registered attendance approaching a half thousand. In size as well as in activity this Association may justly be said to rank first among the state associations.

The convention just closed was marked by lively interest and animated discussions. The year's work, however, is not to be measured alone by the convention proceedings, as more important work has been going on during the year. The members of the Association have much for which to be grateful to its active and efficient officers in looking out for their interests. The work of President Martin in combating adverse legislation at Columbus displayed an energy, an ability and a fidelity to the interests of the Association members such as are seldom encountered except among paid officials. The steady and painstaking work of Secretary Gaskill in promoting the general interests of the organization is always in evidence, and now that the Association has determined to publish a monthly bulletin, the activities of the indefatigable secretary will no doubt result in still further benefits to the members.

The work of the committees of this Association has something more to show than the delectation of those attending the convention, and still more may be expected from them in the future. During the past year the Meter Committee instituted the holding of sectional conferences among the meter men of the state, and these no doubt result in greater benefits than are to be obtained by attendance at the annual convention and at the same time entail less expense to those attending.

The Insurance Committee has done very valuable work in demonstrating that the premiums for fire insurance which are paid by central stations are entirely out of proportion to the benefits received and that such premiums are almost entirely clear profit to the insurance companies. Notwithstanding that it has been demonstrated that the central stations represent very slight risks from fire, it seems to be almost impossible to obtain any concession from insurance companies in the matter of rates, and apparently the utility companies are to be driven to the necessity of carrying their insurance through

the medium of mutual associations. Under present conditions of insurance management such a result seems inevitable, even if it were not the preferable procedure anyhow.

The publication of a bulletin by the Association will no doubt result in keeping members in closer touch with local legislation and matters of all kinds affecting the interests of utility companies. This state association undoubtedly offers its members advantages that are seldom realized by other state associations, and the proposed increase in dues seems entirely in harmony with these. The Association finds itself in such good working order that it is not considered desirable to submerge its individuality by affiliating with the National Electric Light Association. While many of the members are no doubt also members of the national association, there seems to be a sufficient field for maintaining a separate organization.

The publication of the bulletin will supplant the annual publication of the souvenir program, which has been a feature of the Association conventions in the past. The abandonment of this feature and the decline of interest in the convention exhibits are both in harmony with the newer point of view of the Association's sphere, which is broadening out in a manner which makes the annual convention and its accompaniments of less and less importance, while emphasizing all-the-year-round activities. This does not indicate, however, that the conventions are at all on the decline, since this comparison is merely relative, and we shall expect to see in the future as in the past each annual convention result in the gathering of greater numbers and the discussion of the more important questions of general interest.

FRANCHISES.

One of the most interesting features of the Ohio convention was the address by Mr. James V. Oxtoby on the subject of franchises. The perpetual franchise has long been looked upon by the public with disfavor, and even the long-term franchise, in cases where the utility company is not subject to regulation which will secure to the public fair and just treatment, is generally regarded as obnoxious to the public interest. Feeling in this matter has developed to such a point that general measures have been taken in some communities to prevent grants for long periods of years. Thus in Michigan the state constitution limits all franchises to a period of 30 years, and in Ohio the constitution provides that the legislature shall have power to revoke any grant or privilege which has been previously conferred.

With the advent of efficient and general regulation of utility corporations by state commissions, the objections to long-term franchises disappear, and indeed the best interests of both the utility and the public are served by a grant for an indefinite period, or as usually termed, by an indeterminate permit. When such a permit is safeguarded by the proper provisions, such as placing the utility under the complete jurisdiction of a public service commission and reserving to the municipality or other unit of government the right to purchase when desired, such permits are without objection and offer the means for securing the best service at the lowest cost to the public. That this is not generally realized there has been much evidence, such as the statement of Governor Dunne, of Illinois, in approving the public utility act recently enacted in that state, when he claimed that the Illinois law was "free from some of the objections to the Wisconsin law, such as the indeterminate permit."

If city councils and other bodies granting franchises were to carry out literally the provisions of short-term franchises and require the utility corporation to cease operation and remove its property at the end of the term of years for which the franchise is granted, the result would be a large and unnecessary increase in the cost of utility service. It would mean that the depreciation account, instead of being based upon the natural life of property employed in the service, must be figured upon a term of years not exceeding the duration of the franchise, and the estimate of operating expense would have to include the expense of removing the property at the end of this term. It must be obvious that where the term of a franchise is short this would represent an expensive and impracticable condition. As a matter of fact, short-term franchises are usually granted with the idea of making a new bargain with the utility company at the expiration of the term and not with the idea that the utility company shall cease operation. With the advent of state regulating commissions this bargaining between the franchise-granting body and the utility corporation becomes unnecessary, and the argument for the short-term franchise ceases to exist.

The minimum cost for supplying any utility service will be attained in cases where the design and operation of the plant are based upon continuous and unlimited operation rather than upon a definite period of time, and the utility company can with safety operate upon this basis only when it is free from the hazard of a discontinuance of its right to operate. A limited-term franchise is economically unsound, and the sooner the public realizes this the sooner will the cost of utility service reach a minimum. With the growth of the proper idea of what a franchise means will come a realization that it is not a grant of financial value, that it should not be taxed, and should not be included among the intangible values upon which a utility company should be permitted to earn a return. A franchise is merely the grant of a right to perform certain acts and to maintain property upon certain public ground for the furnishing of service, and under proper regulation of rates has no earning power of its own. Only under the supposition that it enables a utility corporation to charge more for its services than they are worth can a financial value be attached to such a franchise right.

The British Wireless Chain.

The British Government is negotiating a new agreement with the Marconi Company respecting the erection of the stations necessary for the Imperial wireless-chain scheme. The repudiation by the company of the original contract, which has caused so much discussion, has been agreed to by the Postmaster General, as the delay has justified such action. The additional cost per station consequent upon the loss of time is put down at $30,000. The company asked for $20,000 on account of a staff of engineers kept available for the past twelve months, but the Postmaster resisted the demand and it was not persisted in. The company guarantees land working under all conditions, but it will not guarantee automatic working at high speed during temporary periods in which the atmosphere is affected by serious electrical disturbances, in the present stage of the science of wireless telegraphy. The company insists on ten per cent royalty on the gross receipts, otherwise it prefers to have no contract.

The Government has considered again whether the erection of stations could be done by a staff of government engineers using the Marconi patents, but the Post Office has no staff to do the work and the Board of Admiralty is unwilling, and unable, without serious interference with its own work, to undertake the erection or working of the chain. The Admiralty staff is fully employed and cannot be diverted without serious detriment to its own work. There is no one in England, outside the Admiralty and the Marconi Company, who in the opinion of the Government advisers, has had any actual experience either in the erection or working of long-range wireless stations, and if an engineer without experience were chosen he would have to collect a staff as best he could, and to prepare fresh designs, and experience in a most difficult undertaking would have to be gained as they went along.

For these and other reasons the Postmaster General advises the new agreement mentioned, and members of the cabinet have divested themselves of their much discussed shares in American Wireless in order that they may be free to vote without further suggestions of interested motives.

Big Water-Power Permit.

The largest water-power permit ever issued by the Department of Agriculture was signed on July 16 by Secretary Houston, granting rights to the Pacific Light & Power Company of Los Angeles to operate power plants in the Sierra National Forest. The company will transmit electric power 240 miles to Los Angeles at 150,000 volts. The permit allows twelve years for construction. Four power houses, two reservoirs, and 25 miles of cement-lined tunnels will be built. Part of the power will be used for pumping water for irrigation in the upper San Joaquin Valley. The power will be carried over a double steel tower line of stranded aluminum cables.

Higher Tungsten-Lamp Efficiency Attained.

The General Electric Company has announced further advances in the direction of higher efficiency of the incandescent lamp. The new lamps contain especially shaped tungsten filaments and are filled with inert nitrogen gas at a pressure of about an atmosphere. The types which it is expected to first develop are adapted to comparatively high current consumption, 6 amperes and above, and operate at a specific consumption of 0.5 watt per candlepower. This is fully twice as good an efficiency as the most efficient incandescent lamps heretofore available.

The new lamps promise to be of particular value in a field not heretofore covered by incandescent lamps, and should greatly broaden the application in which they can be used advantageously, particularly in the direction of very large candlepower units.

Motor Club Outing.

The Electric Motor Car Club of Boston held an outing at the New England Kennel Club, Braintree, Mass., July 16, being the guests of President Charles L. Edgar of the Edison Electric Illumininating Company of Boston. A ball game and other sports were followed by the dinner at which Day Baker, president of the Motor Car Club, presided. Speeches were made by Mr. Edgar, Fred M. Kimball, Converse D. Marsh, E. S. Mansfield, D. C. Tiffany, S. R. Bailey, W. H. Atkins, Charles J. Hatch, Guy Emerson and W. H. Whiteside. Announcement was made by Mr. Tiffany that the Peerless Company had taken over the agency for the Rauch & Lang Electric in Boston.

Power Plants Destroyed.

The power plant and car barn of the Interurban & Terminal Company at Deer Park, near Cincinnati, O., were destroyed by fire on July 7. The loss was estimated at $75,000.

The municipal lighting plant at Clayton, Ala., has also been destroyed by fire. The loss is $15,000.

Two New Telegraph Cables.

Two new telegraph cables connecting the United States and England by way of the Azores are to be laid.

The Thomson Quarter Century Club.

Over 100 men recently celebrated the fact that they had been employed by the General Electric Company, or its predecessor the Thomson-Houston Electric Company, for at least 25 years at Lynn, Mass.

On Saturday, July 12, at the Point of Pines, an attractive ocean resort near West Lynn, there was a convention outing of what is known as the Thomson Quarter Century Club. The usual sports and some unusual speeches were features.

Among the speakers introduced by toastmaster E. R. Howe, were Elihu Thomson, W. C. Fish, Fred Hitchcock, E. C. Butterfield and J. R. Johnson.

It is found that nearly 140 men have been employed by the company for 25 years, while among those whose term of service reaches thirty years in 1913 are Dr. Thomson, Charles M. Morey, W. H. Outtrim, P. Madden, J. R. Johnson and five or six others.

As the great expansion of the industry began about 25 years ago it is expected that the membership of the club will be greatly augmented within a few years.

The committee in charge of arrangements this year was John Foulds, Wm. H. Outtrim and E. R. Howe. Of the present members it is said that Inspector Ambrose H. Carsley is the only one born in Lynn. The committee to arrange for next year's outing consists of L. S. Urquhart, Z. N. Lord, and C. E. Harthan.

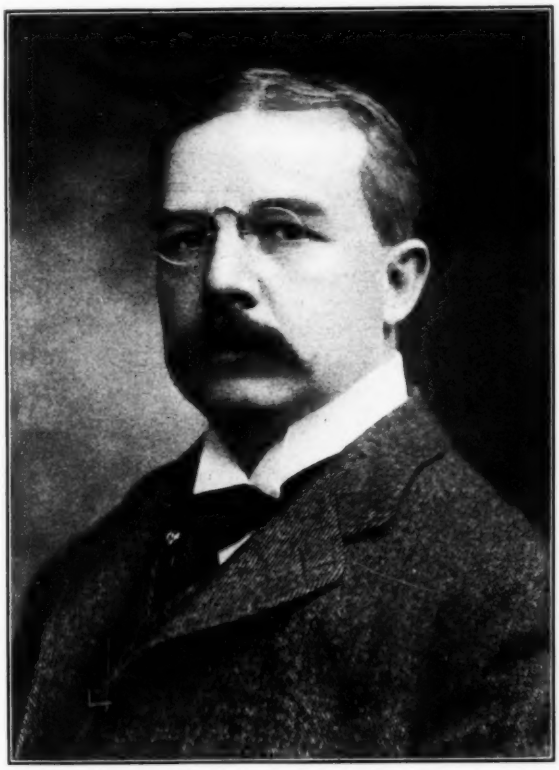
Vermont Telephone Investigation.

A commission appointed by Governor Fletcher of Vermont for the investigation of the telephone situation in that state has reported. The commission finds that the control exercised by the New England Telephone & Telegraph Company "is accomplished by means of the ownership of a majority of the stock in companies either organized or purchased. The companies were created for the sole purpose of stamping out competition. Every company of importance is dominated by the New England Company through so-called traffic and purchasing agreement." The commission recommends a 20-per-cent reduction in the toll rates within state limits.

The New England Compny protests against the reduction in rates and claims that the investigation was superficial, by inexperienced men, and of only a month's duration. The company states that it will prove that it is not earning a fair return on its investment in Vermont. It holds that the commissioners in asking for a list of stockholders and holdings in subsidiary companies, which was refused, made a request which involved the personal rights of stockholders.

H. M. Edwards.

So busy have we been in the development of the technical and commercial side of central-station work that for a long time we have been prone to consider that these two departments of the industry represented practically all that there was to it. It is interesting to note in reviewing the proceedings of the National Electric Light Association for the past quarter of a century, how discussion has revolved about, first, the evolution of the generating station and its equipment, and the outside and inside engineering facilities, then have been centered to a greater degree with respect to the commercial department and increased interest in the selling organization of the central station. Within recent years both in the central-station industry and in electric railway practice the accountant and auditor have come to the front, and quite recently there has been a great deal of attention paid to standard classification of accounts and rational methods of cost-keeping. The accounting sessions of the Chicago convention of the National Electric Light Association demonstrated the great opportunity that existed for the discussion of accounting problems and the program was one of the most interesting of the elements making up this most successful gathering of central-station men. The accounting department, far from being only incidental to central-station service, is one of the most important branches of the business. Upon it depends an accurate understanding of the relations between the operating and contract departments and the income derived from the various classes of consumer. This department is concerned also to a very great degree in the psychology of the business inasmuch as it passes upon the credit of the consumer, and is in a position to make or mar, to a great extent, the friendly relations of the company with its customers.



H. M. Edwards.
Auditor of the New York Edison Company.

The subject of this sketch, H. M. Edwards, entered the employ of the Manhattan Electric Light Company in New York City, as auditor, in August, 1889. In the fall of that year he was also appointed auditor of the Harlem Lighting Company, a separate corporation but one which was practically operated by the Manhattan Electric Light Company. In 1891, he was elected secretary and a director of both of these companies. In September, 1895, he was appointed auditor of the Edison Electric Illuminating Company, of New York, making his headquarters at the main office of that company at 55 Duane Street. He continued his official connection with the Manhattan Electric Light Company and the Harlem Lighting Company until these companies were merged with the Edison Electric Illuminating Company, of New York, in February, 1899. In that year he was appointed auditor of the New York Gas & Electric Light, Heat & Power Company, as well as the Edison Electric Illuminating Company until both companies were consolidated into the present New York Edison Company, May 1, 1901. He was elected auditor of the consolidated company at the time of its incorporation, and is still connected with the company in that capacity.

Mr. Edwards has always taken a prominent part in the development of the accounting departments of public service companies. He has contributed a number of papers to the proceedings of the National Electric Light Association and the Association of Edison Illuminating Companies. He has had time also to devote himself to matters outside of the strictly accounting department of his organization, and as a recognition of his widespread activities he was a few months ago elected chairman of the New York Edison Company Section of the National Electric Light Association.

Mr. Edwards was born in New York, in July, 1860, and educated in the New York public schools and the College of the City of New York.

Fifty Million Dollars for English Telephones.

Postmaster General Samuel told a deputation of London business men who went to him with a list of grievances respecting the telephone service, that his officers did not pretend that the service had reached the standard of efficiency that they desired it to attain. The number of junction lines was being increased; the number of ineffective calls due to insufficiency of lines was less than one-half per cent for the latter half of last year. The London exchanges are being modernized; fifteen million dollars have been spent during the year on new telephonic construction and development, and shortly Parliament will be asked to give its authority for the expenditure of fifty million dollars within the next few years.

Large extensions are being made to trunk line service. Mr. Samuel's department is on the look out for a meter which will register accurately the number of a consumer's effective calls — complaints of overcharges have been numerous for a long time past.

Wireless Communication With Berlin.

Regular wireless communication between Germany and the United States has been brought appreciably nearer by successful experiments recently conducted between the German Telefunken Company's station at Sayville, L. I., and the great central station at Nauen, near Berlin.

For the first time on record telegrams totaling 28 words were transmitted from Sayville to Nauen by means of Count Arco's high-frequency apparatus on July 12.

Still more remarkable was the fact that only six kilowatts were required, while recently for the transmission of mere sounds from Nauen to America more than 100 kilowatts were needed.

The 12-mile narrow-gauge steam railroad from Valencia to Betera, Spain, is to be electrified.

American Mine Safety Association to Hold Convention at Pittsburgh.

The annual meeting of the American Mine Safety Association, composed of leading coal and metal-mine operators, mining engineers, mine-safety engineers, and mine surgeons will be held in Pittsburgh, Pa., September 22 to 24. This association, which held its first meeting a year ago, has for its purpose a reduction of the number of accidents in mines and quarries (there were 3,602 fatalities in the year 1911) and the alleviation of the more than 60,000 men who are injured each year.

Following the recommendations of the Bureau of Mines in the last three or four years many mining companies have organized rescue corps and first-aid teams, and as a result a number of different methods of procedure following mine explosions and fires and in the caring for the injured have developed. The men who gathered a year ago to form this association felt there was great need for greater uniformity in the work of the rescue and first-aid crews and at that time some very important recommendations were made.

This second meeting, which has been called by H. M. Wilson, of the Bureau of Mines, chairman of the Executive Committee of the Association, promises to take up and discuss a number of the problems that have arisen in both the rescue and first-aid work. The members of the association declare that greater progress can be made in saving life and in reducing the seriousness of injuries by the adoption of the proposed standard methods.

Mr. Wilson, in discussing the association, said, "The object of the American Mine Safety Association is to promote the science of safety in mines and mining by the adoption of improved first-aid methods, and of logical methods of procedure in rescue and recovery work in mine disasters; to recommend the adoption of approved types of first-aid and mine-rescue and recovery appliances; to obtain and circulate information on those subjects; and to secure the co-operation of its members in establishing proper safeguards against loss of life and property by explosions, fires, etc.

"Workingmen's compensation acts have in recent years been passed in 15 states, of which 10 were enacted in the year 1911 alone. The rapid spread of legislation compelling employers to care for injured workmen clearly shows the importance to the employer of reducing the liabilities by every means at his disposal. These are of two kinds, namely, safety or preventive measures and protective or rescue and first-aid methods.

"Mine operators now realize that it is more expensive to restore wrecked mines, more costly to fight damage suits through the courts and less profitable to pay regulated liability charges or even workmen's compensation, than it is to bear the cost involved in reducing these charges by means of diminishing the number of accidents and the duration of the resulting disability by the adoption of improved safety, rescue and first-aid methods

"Since 58 per cent of all industrial accidents are shown by statistics to be due to negligence, carelessness or lack of knowledge of employers or employees, the vital necessity of learning everything possible about the causes and means of preventing these accidents must be evident to every man concerned in mining. To the operators it spells business success or failure; to the miner, life or the physical ability to work and support a family."

The program for the coming meeting will include a mine-rescue and first-aid contest at Arsenal Park on September 22; in the evening a reception to the members and motion-picture lecture on the mining industry.

On the second day the opening session of the Association will be held, in the morning, and a report of the Executive Committee will be made on the proposed constitution of the society. In the afternoon there will be an explosion in the experimental mine of the Bureau of Mines at Bruceton, Pa., to which all the members will be invited to be present.

On September 24, the third day, there will be a business session at the hotel and election of officers. In the afternoon members will visit the Experiment Station of the Bureau of Mines at Fortieth and Butler Streets, Pittsburgh, Pa.

Census Statistics of the Wire Industry of 1909.

Statistics for the wire industry in the United States for the year 1909 have finally been compiled and are soon to be published by the Bureau of the Census, Washington, D. C. Although presenting data regarding the manufacture of many kinds of wire not electrically used, the report discloses important facts relating to the industry as a whole and also some figures on the production of electrical wires and cables. Following are some extracts from the preliminary report:

The manufacture of wire in the United States is carried on by three classes of establishments: (1) establishments whose principal business is the drawing of wire from rods which are either purchased or transferred from independently operated rolling mills of the company, thus including the detached and independently operated wire mills of companies rolling the wire rods; (2) establishments that roll iron and steel, copper or other metals or alloys, and maintain wire-drawing departments supplied with rods from the co-operating rolling mills; and (3) establishments whose principal business is the manufacture of some quite different product, but which incidentally draw some wire.

There are many establishments which draw no wire, but which manufacture wire goods (fencing, wire cloth, springs, etc.) from purchased wire. Such establishments are not covered by the census statistics for the wire industry.

The total number of establishments in the United States in the wire industry as a whole in 1909 was 93, of which 56 were wire-drawing mills proper which purchased the wire rods used, 31 were wire departments of rolling mills, and 6 were wire departments of other concerns.

The total value of the product of these 93 mills or wire departments was $180,083,522, of which $173,349,614 consisted of wire and products derived therefrom.

Of the 93 establishments in the industry in 1909, 59 drew iron and steel wire exclusively, 7 drew copper wire exclusively, 6 drew wire from materials (chiefly brass) other than iron and steel or copper, while 21 drew wire from two or more of the metals.

The cost of materials in 1909 represented 71.7 per cent of the total value of products, and the value added by manufacture was 28.3 per cent.

Of the total cost of wire rods used by the industry as a whole, 60 per cent represented the cost of iron and steel rods, 36.3 per cent that of copper rods, and 3.8 per cent that of rods of other metals or alloys.

The manufacture of insulated wire and cable to the value of $9,806,989 was reported by the establishments in the wire industry in 1909. Most insulated wire is made by establishments in the industry designated as "electrical machinery, apparatus, and supplies." The total value of the insulated wire and cable manufactured in 1909 was $51,624,737.

In the production of steel and iron wire, Pennsylvania led in 1909 with 851,448 tons, or 35.6 per cent of the total amount of such wire drawn. In the production of copper wire New Jersey led with 63,452 tons, or 43.1 per cent of the total; and in the manufacture of wire from brass and other metals or alloys Connecticut was far in advance of any other state.

Electrically Operated Shovels.

The electric shovel is becoming more and more popular because of its simplicity, reliability and economy of operation. Some of the advantages of electric over steam shovels are discussed in this article and comparative cost data on several installations presented.

It is quite logical that electric power should have found its way into the field of excavation. It has been applied to hundreds of different lines of industry with entire success. In fact, electric power is ideal for most purposes and may be accredited with large savings in the power bill in practically every installation. There are few places where steam power is used that cannot be better and more economically served by electricity.

The electric shovel is becoming more and more popular for use in places where current is available because of its simplicity, reliability, and economy of operation. The elimination of the boiler does away with considerable attendance and maintenance expense, and the ruggedness of the modern electric motor makes it an ideal form of power for rough work of this nature. No fireman is required, and the shovel, therefore, becomes a "one-man machine" in every sense of the word. The question of water supply is avoided, together with that of transportation of fuel. In cold weather there is no danger from freezing. In hot weather there is no boiler to add to the discomfort of the operator. The banking of fires at night, the delay in getting up steam in the morning, and frequently the necessity for a watchman when shovel is not in operation, are all features worthy of consideration, and which are avoided by the use of electric power. In view of these advantages, which are being more generally recognized each year by contractors and industrial corporations, a brief account of several noteworthy installations of electric shovels may prove of interest.

There is probably no other city in the country where buildings are closer and where the conditions for new building work are more unfavorable than Boston. Contractors executing jobs in this city have to be very careful that they do not use any outfits which might incur their being fined by the smoke inspectors, as in Boston they have a very rigorous smoke law. On July 1, 1910, this smoke law became effective and since that time as owners of plants, engineers and firemen have co-operated, the law has been quite successful. The use of the electric shovel on such important excavation work as the City Hall on Court Street and the Merchants Bank Building on Exchange Street indicates what the contractor is doing in this connection.

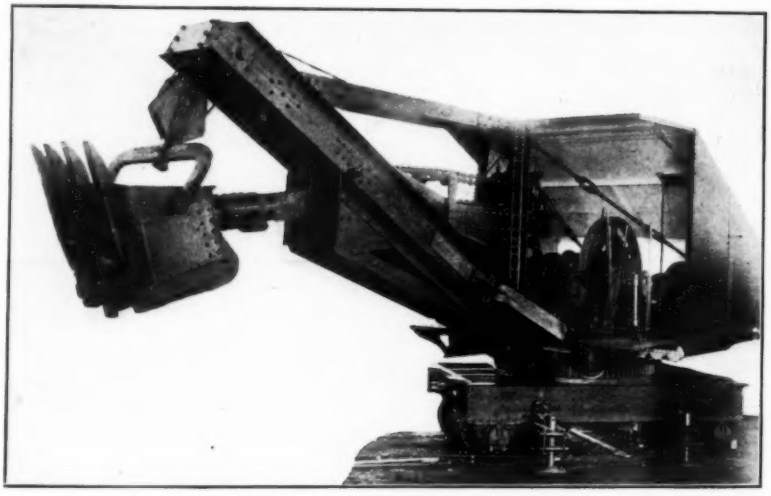
Electric Shovel Used in Excavating for Subway.

On the City Hall work a Thew Type No. 0 electric shovel was used. The area measures about 225 feet by 60 feet and is surrounded by buildings, one of them being Young's Hotel, thus

making any noise or smoke particularly objectionable. On the site was formerly the Old Boston Court House which was torn down. It has been necessary to excavate on the average to a depth of 20 feet. The soil was fairly loose at the top but near the bottom clay and rocks were encountered. After a study of all the conditions Wells Brothers Company of New York, the building contractors, decided to use an electric shovel for this work.

During the operation of this shovel the digging attracted much attention, for even passers-by could recognize the many advantages of handling excavating work in this manner over hand labor. The shovel was operated by current supplied direct from the Edison lines which were brought in at one side of the street. In excavating the material it was necessary to crowd the dipper forward into the material—a horizontal motion, and second, to hoist the dipper upward through the material—a vertical motion. The dipper cleaned out the dirt to the grade upon which the shovel was operated.

The teaming was done by two-horse, 40-cubic-foot end-dumping wagons which had to descend rather a steep incline into the excavated part. Each team made on an average of from 11 to 12 trips per day of nine hours. About 28 or 30 of these teams were kept busy and it only took a wagon about 10 minutes on an average to go from the street level down to the electric shovel, get a load and return to the street. It only took two lifts of the shovel to completely fill one of the wagons. A hoist and cable was used to assist the wagons up to the street level. The actual time required from three men to fill by hand labor any one of the wagons with loose earth, where no digging was required, was about 15 minutes. It can readily be seen that the electric shovel effected a big saving in time over hand labor, to say nothing of keeping more teams busy and doing more work. It was noticeable that the shovel was not only useful in excavating but was also used for lifting huge rocks upon the wagons, a chain being simply slung around the rock and fastened and the signal given to the operator.



Thew Electric Shovel.

Certainly the operation of an electric shovel is a one-man job. The operator stood by the levers and had absolutely no assistance. No fireman was required, and the question of water supply was avoided, together with that of transportation of fuel. The electric shovel had the further advantage that in cold weather there was no danger from freezing, while in the hot weather the operator was not troubled by discomfort due to boilers.

The Central Construction Company, of Boston has used a steam shovel for a good deal of digging work in and around Boston, and it is interesting to note that when operating in the City of Boston, they found it was necessary, in order to be free from smoke law fines, to use different kinds of coal. To be safe they used a mixture of two-thirds of a ton of soft coal costing $4.50 a ton, and one-third ton of hard coal, costing $12 a ton. This made the cost of coal $7.00 per ton, and even then the contractors state they had to be more careful as to firing.

The labor cost of operating an electric shovel with a one-cubic-yard dipper on railroad work in Canada figured out as 0.029 to 0.037 cent per cubic yard. While the conditions were different it may be interesting to note this cost with the figure furnished by the Central Construction Company of Boston in operating a steam shovel:

Engineer. .	$6.00	per day
Fireman. . .	3.00	" "
Two trackmen at $2.25	4.50	" "
Coal at $4.50 per ton	1.25	" "
Totals. .	$14.75	" "

The average output for an eight-

Meter Box for Portable Shovel.

Portable Electric Shovel in Building Work.

hour day was about 350 cubic yards making the cost per cubic yard 0.042 cent.

The use of a shovel of this character saves a great deal in team time. The crews ordinarily employed in hand shoveling will load a two-yard wagon in from 6 to 10 minutes. The machine offers the further advantages of letting the teams away quickly when bunched and when the delays in loading affect not only the team being loaded, but the others that are waiting. It is believed that an average saving for the shovel in team time of three minutes per yard loaded is conservative. This represents a saving of about $9.00 or $10 daily, an amount almost equal to the entire cost of operating a shovel with a rated capacity of 35 to 40 cubic yards per hour.

The Canadian installation referred to is used by the Brantford & Hamilton Electric Railway Company, at Hamilton. The shovel weighs 25 tons and has a radius of cutting at a height of nine feet of about 24 feet. The shovel is mounted on a railroad truck, and has a full circle swing. It is equipped with a 35-horsepower compound-wound direct-current motor, receiving current through the truck by wire cables. A one-cubic-yard dipper was used on this shovel. Two men were employed, one for operating and the other for tripping, the men changing places frequently.

The conditions under which this shovel was worked were most favorable. It was used in a gravel pit, the depth of the cutting being about 14 feet. The material was very easy to handle. The pit was very long, so the shovel did not need to be shifted often, and inasmuch as it makes a complete swing, the time of shifting was very short. A special trolley wire was used for the motor in the shovel, so that the current was constant. This is an important feature of an electrical installation. No time was lost in moving the shovel ahead, as the two men working in the pit would clean out a space directly in front of the shovel, when the machine would pick up a section of track in the rear and place it in the newly cleaned space. While the two pitmen were fixing this piece of track the shovel would take gravel from the side, so that not more than a minute was required to move the shovel ahead.

The company had an ample supply of flat cars on which were loaded 14 cubic yards loose measurement. There were also plenty of motors to haul the trains away, six cars making up a train. One motor car was used to spot the cars continuously, and a man was employed as a signalman to assist in spotting cars. The shovel worked a ten-hour shift, and any repairing and overhauling was done at night by another crew. Operating in this manner, as a rule, the shovel was loading the maximum time, there being but little time lost in placing cars under the dipper and in moving ahead. With the electrical current no time was lost in taking supplies of water and fuel.

The trains that carried the gravel away were operated by a motorman and one other man. A plow, pulled by the motor car, was used to unload the cars, and two men were kept on the dump to handle the cable of the plow and to attend to other details.

Owing to the large supply of cars and motors, to the favorable conditions in the pit and the method of operating, the output of the shovel per day did not vary much. A great many days 100 flat cars were loaded each day and hauled away. This meant an output of 1,400 cubic yards loose measurement, or 1,050 cubic yards place measurement.

On some days the output fell to 80 carloads or less, equivalent to 800 cubic yards place measurement.

LABOR COST OF OPERATION.

Employees	Rate	Amount	Cost per cu. yd.
Superintendent	$4.00	$4.00	$0.004 to $0.005
2 Shovelmen ...	3.00	6.00	
2 Pitmen	1.50	3.00	
1 Motorman	3.00	3.00	
1 Signalman ...	1.50	1.50	0.013 to 0.017
2 Motormen	3.00	6.00	
2 Trainmen	1.50	3.00	0.009 to 0.011
2 Dumpmen	1.50	3.00	0.003 to 0.004
Total		$29.50	$0.029 to $0.037

To this must be added charge for power, plant charges, repairs and track work. The figures make evident the economical features of excavating with a shovel of this type, as small and inexpensive crews are employed, and a comparatively large output can be obtained by using the best methods.

One important feature of these electrically operated machines is the fact that the operating levers are the same as for steam shovels. Thus the old steam shovel runner is enabled to handle successfully the modern electric machine without difficulty.

Commercial Practice
Management, Rates, New Business

NEW BUSINESS.[1]

By J. E. North.[2]

The subject of new business has been given a great amount of consideration during the past few years by central stations, both large and small, and has been so thoroughly discussed that it occurs to me that it might be best to mention some of the plans and forms we use in Springfield and relate some of our experiences with the hope that sufficient interest will be taken to bring about a discussion which will result to the benefit of central stations generally.

New business is the result of electrical education which is brought about in three ways: solicitation, advertising and association of satisfied customers.

Solicitors.

It is extremely difficult to secure desirable representatives for new-business work. It has been suggested that the central station secure men with technical or practical knowledge of the electrical business and train them for the work. I do not know of the experience of others; but in our case, we have found it next to impossible to find a man with the knowledge who has the necessary selling ability. Better success has been obtained by taking a man who is capable of selling and teaching him the business. In training these men, we should not overlook the fact that they should have a general knowledge of the business; a knowledge which will enable them to answer questions pertaining to the power plant, lines, transformers, meters, etc. In fact, the complete details of manufacture should be explained to them from the coal pile to the consumer's lights and appliances. The more knowledge they have of conditions, the more intelligently they can talk to the people with whom they come in contact.

1 A paper presented at the convention of the Ohio Electric Light Association, July 16.

2 Commercial manager, Springfield Light, Heat & Power Company, Springfield, O.

After a new solicitor has a certain amount of knowledge as above outlined, he should be instructed concerning the clerical work, including office and store room records. He is then prepared to take up actual new-business work. Let him learn the facts concerning contract forms, rates and reasons for every rule under the head of general rules on the contract form. He is then ready to take up the subject of appliances, lamps, etc., and by having him take advantage of the information in the manufacturer's catalogs, the proper kind of a man can arrange his own selling arguments.

Let your man know something about the business secured by other solicitors so that he will have some idea of your expectations.

Above all things, pay your solicitors what they are worth. If they can't get the business, don't keep them, and if they "deliver the goods," pay them full value. When we pay for 100 feet of wire, we are not satisfied with 75, and neither do we expect 125 feet for the price of 100. Most companies pay their solicitors a straight salary. I am of the opinion that it would be better to pay them a salary plus a commission. This would create more of a desire to increase the business, resulting in the mutual benefit to the solicitor and the company.

We should impress upon the solicitor's mind early in the game that people are most interested in saving a dollar. Little does the average man care to know about horsepower, kilowatt-hours, kilovolt-amperes, etc. You can recall a time when a prospective customer wore a disgusted or troubled look on his face while you were talking about load-factor, maximum demand, power-factor, or some similar term.

Solicitor's Reports.

We have tried the scheme of having solicitors report daily, giving the name and details concerning each call, but decided that this required entirely too much time for the benefit derived. No man can get business by spending a large per cent of his time in the office.

Special reports are made in writing of unusual things, while matters generally are discussed concerning the past and present day's work during the morning interview.

We have a separate clip for information concerning each solicitor's territory. These clips are examined morning and noon and notes are made concerning the information. When the subject has been completed, everything pertaining to this particular subject is removed from the clip and is pinned to the final report or contract and is laid on the commercial manager's desk for final distribution.

About the only daily report which is made for future reference is made in a record book by the solicitors under the following heads; number of new contracts secured; wattage of new contracts; number of successor contracts; number of renewal contracts; watts added to former installations; amount of sales; wattage of appliances sold; number of calls; number of hours devoted to new business; number of hours devoted to miscellaneous business.

On Saturday of each week, the solicitors total their business for the week and comparisons are made. When the solicitor returns to the office, he makes out the service order which is attached to the contract and his next duty is to record this contract under the following heads: month; date; name; address; character of business; watts new contract; watts successor contract; watts renewal contract; watts added; date to be connected; old or new house; name of solicitor.

The contract and service order is then passed on to the commercial manager for examination. If the contract has been properly signed and service order has been made out correctly, they are then passed on to the secretary for credit. If credit is found satisfactory, service order is then passed on to a clerk of the line and meter department who makes out an inspect order in duplicate. If the building is located so it can be reached without an extension of the line, the order is O. K'd. by the line foreman and the duplicate is passed on to the meter department which sends an inspector to the applicant's premises, advising him that we can or cannot connect the service, as the case may be. The lower half of the duplicate is returned to the commercial department with an exact copy of the information left on the customer's premises. In the event applicant has not made the proper provisions for service, we either write him or have one of our solicitors call in order to remedy the difficulty at the earliest possible date and if the installation is ready to be connected, we are usually able to supply service within 24 hours from time application is signed. In the event the line foreman advises that the applicant cannot be reached without a line extension, if conditions look favorable, we have an estimate made on the cost of extension and attempt to secure additional applications.

APPLICATION FOR LINE EXTENSION.

Agreement made this.....day of....., by and between the Springfield Light, Heat & Power Company, hereinafter called "Company" and, ...hereinafter called "Applicant."

In consideration of the Company making investment to supply Applicant with electricity, the Applicant agrees to have building located at ..... wired ready for Company's meter. If building is not ready for service on date that Company's line is completed, Applicant agrees to pay to the Company, one and one-half ($1.50) dollars each month from date line is completed until Applicant is ready for service.

Service will then be supplied at rates as specified on attached application.

The Springfield Light, Heat & Power Company.

By .....

By .....

Owner of Above Property.

We have all experienced difficulty in having applicants use service after extensions have been made and unless there is some obligation on the part of the applicants, they will gladly sign the application form in order to assist their neighbor in getting service. In the end, there is considerable investment without sufficient business to justify. We overcame this difficulty by getting out the form herewith:

By using the above, we have been able to single out the people who were really sincere in their requests.

Sale of Appliances and Motors.

In the majority of towns, central stations are obliged to sell appliances and motors in order to further their interests; otherwise, sales would be comparatively few. The contractors in small places, having a limited amount of capital, cannot carry much of a stock; besides they do not seem to have the time to devote to the sale of appliances and ordinarily their knowledge of motors is so limited that they are not capable of giving a customer the desired information. It is not my intention to discourage the contractors in the sale of appliances; on the contrary, central stations should make every effort to co-operate with them. We encourage the contractors by selling appliances at a reasonable profit and by furnishing them with a small stock at our cost.

There is a question in the minds of some as to the appliances which should be carried by central stations. Sell the appliance that will net you the most at the end of the year. For example: irons, toasters, percolators, and continuous type cigar lighters. Give articles of this kind preference and secondary consideration to electric washers, sewing-machine motors, etc. From time to time, we receive letters from manufacturers with the following in bold type: "Do you want to increase your day load?" In a great many cases this is a joke.

For comparison, let us consider the electric iron and the electric washer. Say, we sell the iron for one dollar more than cost price and the washer for twenty dollars more than the cost price. Apparently, the washer is the more attractive proposition. The wattage of the iron is 550 watts, while the wattage on the motor of the washer is less than 200. For convenient calculation, we will assume that the average demand of the motor is 200 watts. The iron is used on an average of three hours per week and the washer two hours per week. With the rate of 8 cents per kilowatt-hour, the income from the iron would be $6.86 per year

and $1.66 on the washer. The result at the end of five years is $34.30 for the iron and $8.30 for the washer. It takes considerable time to sell washers and a large amount of time for demonstration and every few months we are likely to get a telephone call which results in more expense in connection with this call; so, in the end, it occurs to me that it is better to sell one iron at $3.00 than it is to sell an electric washer at $55.00.

Demonstration of Appliances.

"Seeing is believing," and, believe me, most people have to be shown before they will lay down their change for an electric device. We believe in letting them "taste the pudding." We keep a good stock of salable appliances on hand and send them out for 10 days' trial. I say 10 days' trial because a decision can be made at the end of that time. If they agree to keep the appliance, let them pay with the monthly bill or in payments. In most cases, the central stations send out appliances for 30 days' trial. Why have the appliance tarnished or otherwise depreciated unnecessarily? Some companies attempt to make sales by a house-to-house canvass with samples. Some time ago, a salesman was sent to Springfield by a vacuum-cleaner concern with one vacuum cleaner to take orders. He could not make a success of the business as he did not leave the cleaner long enough for the whole family to see and try it. Later, another company sent a man to Springfield to introduce a cleaner and kept him supplied with a stock of 25 machines. He would call on one of our customers, demonstrate and leave the cleaner for 10 days' trial. This resulted in sales to more than 50 per cent of the people to whom he made demonstrations.

Window Display.

Don't put an iron and a toaster in a window and call it a window display. If you sell appliances, let your customer know by making a neat and attractive show window. In addition to the advertising value of the display, you have an opportunity to demonstrate to the merchants the way to properly light a window. If you do not know what to put in a window or how to arrange it, I would suggest that you write to some of the manufacturers, who will gladly make suggestions and send photographs of window displays that have been made by various central stations.

Advertising.

We have learned by experience that best results are obtained from newspaper advertising. Newspaper space used judiciously with the proper copy brings results. A great many central stations make mistakes by agreeing to use space on some certain day of each week. This is a fixed arrangement and is certainly not advantageous to the company. Do not attempt to fill space unless you have something to advertise. Do not agree to take space in special editions when it is not convenient to use the space or prepare

FORM NO. I

Date .....

Name of Company .....
Man to See .....
Nature of Business .....
H. P. of Boilers .... H. P. of Engines .... Gas .... Steam ....
H. P. of Motors Operated by Central Station .....
Cost of Coal per Month $..... Cost of Gas per Month $.....
Total Cost of Power per Month $.....
Hours Factory Works per Month ..... No. of Employees .....
Maximum H. P. Demand ..... Average H. P. Demand .....
Per Cent Fuel Made in Plant .....

copy. Change your copy often and take the necessary time to prepare same so it will be interesting to those who are attracted by it. If you are obliged to use space in the newspapers, the best plan is to contract for a certain amount of space to be used within one year. It is impossible to calculate the results obtained from advertising, but it helps to educate the people and

FORM NO. II.

Date .....

Name of Company .....
Value of Present Equipment .....

Fixed Charges per Year:
Depreciation .....
Obsolescence .....
Taxes .....
Fire Insurance .....
Boiler Insurance .....
Liability Insurance .....
Profit .....
Value of Space .....
Damaged Stock .....
Building Depreciation ....

Operating Expenses per Year:
Coal .....
Gas .....
Labor .....
Oil .....
Water .....
Waste .....
Packing .....
Ash Removal .....
Boiler Repair .....
Engine Repair .....
Belt Repair .....
Superintendence .....
Delays ....

puts them in a receptive mood for the solicitors. In a great many cases, you will use space in the daily papers and will not see any immediate results. I have in mind a case that resulted just the opposite.

On May 10, 1912, we had a bargain day on six-pound electric irons. The idea was not original but was sug-

FORM NO. III

Date .....

Name of Company .....

Cost of Motor Installation:
Motors .....
Wiring .....
Pulleys .....
Belts or Gears .....
Millwright Work ....

Fixed Charges per Year:
Interest .....
Depreciation .....
Taxes .....
Profit ....

Operating Expenses per Year:
Repairs .....
Energy ....

gested by a manufacturer. We spent a small amount in the daily papers and advised our customers that on May 10 we would sell a six-pound electric iron for 75 cents less than the regular price. It was understood that the irons were not to be taken out on trial and each customer taking out an iron must pay cash. On this date we disposed of a large number of irons. With this result, we were satisfied that there was an advantage in newspaper advertising. Prior to about two years ago, we spent considerable money advertising in theater programs, hymn books, cook books, etc. Since that time we have positively refused to take space of this kind. First, we questioned the advisability of turning down the solicitors, especially of churches and charitable institutions; but up to this time we have not realized any disastrous effect. We have also realized a great deal of benefit from blotters, folders, etc., inclosed with the monthly bills. The statement has been made that the customer is not in a receptive mood at the time that he receives his bills and will not pay much attention to inclosures. This may be true in some cases, but it is not uncommon to have a customer bring a folder describing some appliance and ask for further information and price. After their curiosity is aroused to this extent, it is not difficult to make the sale.

Power Business.

It has only been during recent years that the majority of central stations decided to make special rates for daylight load and it is somewhat surprising to find that we still have central stations in this country who fail to see the value of the power business; at any rate, they are not willing to make a price that will get the business.

We have made a special effort during the past four years to build up our day load and our efforts have resulted in an addition of 4,000 horsepower. When you realize that Springfield has natural gas at 30 cents per thousand and that there have been as high as seven factories making gas engines, you will appreciate the fact that considerable effort has been made to secure this business. At the present time, we have five gas-engine factories and are supplying one of the smallest with all the power and light. We have displaced quite a number of gas engines in Springfield and our ratio of new business, when we make the comparison between the central station and all of the gas-engine factories, is about 8 to 1 in favor of the central station.

Some of the business which we have secured is the result of serious gas-engine accidents. In one case, we secured 175 horsepower, in another 225 and in a third 25 horsepower.

Our system for looking after power business is explained by the aid of the accompanying forms. We call on a manufacturer and make our preliminary report on Form I.

After securing the above information, we are able to discuss conditions with the manufacturer and, in the majority

of cases, are able to obtain permission to make test and go deeper into the subject.

While making test of the manufacturer's plant, we are able to secure the information to fill out Form II.

While we have access to the factory, we take advantage of the opportunity of making a sketch of the entire layout, including location of engine and main shafts on the various machines. Data is also secured concerning speeds of the various shafts and pulley sizes. From this we are able to make recommendation for group or individual drive and secure prices on cost of millwright work and wiring. We are then prepared to fill out Form III.

With this information, we make out a detailed report to the manager concerning the facts which we have obtained and make our recommendations. In the event the business is not secured immediately, we file this data for future reference, and if the business is later secured, all unnecessary delays are overcome by having the data on hand.

Co-operation.

The success of the new-business department depends, to a very great extent, upon the support of other departments, especially the line, meter and plant. When a man builds a house or moves from one location to another, he usually neglects the electric-light meter until the very last thing, and then notifies the company that he wants service that very day. I doubt if the people can be more impatient about anything else on earth. Under these circumstances, it depends upon the line department to make the service connections and the meter department to set the meter. It is then up to the plant to "deliver the goods" in such quantities and of such quality that the customer has no chance to complain.

Under this head there is another thing of equal or more importance and that is courtesy. We want every employee of our company to feel that every customer we have pays a certain per cent of their salary and the per cent of courtesy to the smallest customer should equal the per cent of salary paid by the largest and not to forget that the small customer may grow and that some seemingly insignificant customer may have a world of influence in the commercial or political fields. We must be careful about the treatment of people to get business or keep business. The fact that we may have the largest organization or the only lighting company in the town does not permit us to be independent or discourteous. The central-station man who says, "Well, if you don't like our service or treatment, we will remove the meter," is not the man to be associated with the present-day utility company. In the majority of cases there is a foundation for complaint, and however trivial it may seem, it is policy to investigate and correct the trouble or convince your customer that he has no reason to be dissatisfied. The old-time feeling toward public-service companies is gradually wearing off from the fact that the companies have adopted a different policy.

Competition.

Without much consideration, we might decide that our worst competitor is the gas company. I will grant that it takes considerable effort to secure the business where gas has been used for some time in a building, but it is not on account of the low cost of lighting or the desirability, but on account of the investment necessary to make the change. In the case of new buildings, we find it is only a case of having a solicitor "get on the job" and explain the advantages of electric light.

Our worst competitor comes from other sources. It is not uncommon for some politician, through lack of knowledge or prejudice, to start an agitation for a municipal plant. We recently had an experience of this kind but did not suffer from the fact that the majority of our city officials were too broad-minded to permit the proposition to be presented to the people.

The gas-engine companies have helped to make life interesting for us during the past year. They have presented a proposition to some of our customers to install a gas-engine equipment complete with the understanding that payments are to be made monthly. The customer is to pay the gas bill and deduct from that amount the bill for the corresponding month of the previous year and the gas-engine company will accept the remaining amount as payment on the engine and continue thus until the full amount is paid. In 99 per cent of the cases this appeals to the unsuspecting customer, and he has visions of saving 50 to 75 per cent of his lighting bill. We are glad to say that no business has been lost up to this time by this arrangement.

We have also found that the majority of ice-machine manufacturers are not friendly toward central-station drive. It was much to our surprise that a company in Ohio which makes electrical apparatus recommends that our customers purchase engines to drive their compressors. We have had several experiences of this nature but in spite of the fact that these people have engine-driven compressors, high-pressure boilers and licensed engineers, we supply service to all miscellaneous motors.

Rates.

A solicitor can talk to a prospective customer about reliability of service, convenience of operation and safety of electricity, but these items will not make much of an impression if the rates are not within reason. About the first question asked is, "What rate can you make?" The solicitor will be able to occupy the customer's mind for a time but the first and last, the thing that concerns him most is the rate. In the power business especially the rates cut a very important figure. With natural gas at 30 cents per thonsand and coal at $2.00 per ton delivered, we could not expect much power business at a rate of 8 cents per kilowatt-hour. If, after we consider fixed charges, operating expense, loss of time, etc., at an isolated plant and find the net cost to be 3 cents per kilowatt-hour, we can't expect to get twice that amount for the business. The cost of central-station service cannot be too far in excess of isolated costs and you make the rate so that the volume of business will do what had been expected from high rates.

New-Business Committee.

Finally, I would suggest that a committee of not less than five be appointed to secure information and furnish advice pertaining to the subject of new business to all the companies or members of the Ohio Association and present a report to the Association at the next annual meeting. It would be my idea to have the various companies forward information to this committee concerning methods and plans which have been used to get new business or to keep old business and on the other hand, these companies could go to this committee for advice. Nearly all of the electric journals and magazines devote a certain amount of space to this subject and through the unselfishness of some of our friends who are in the business throughout the country, we obtain a great deal of valuable information. The descriptive articles and advertising copies which sometimes appear, explain to us how they have made a success of a campaign or how they have otherwise increased the company's business. By the aid of this committee, we could collect information of this kind from the various central stations who are too modest to prepare an article for publication. At the same time, some of the smaller companies would be benefited by the experience of the larger and could call on this committee for information concerning various things.

Cedar Point, Kans., said to be the smallest incorporated town in that state, having a population of 183, has decided to have an electric light plant and a contract has been let.

Display-Room Car of Middle West Utilities Company.

As mentioned in our issue of July 5, 1913, the Middle West Utilities Company, operating properties in several Middle West states, has fitted up a display-room car to be used in portraying the advantages of electrical appliances in the various communities served by the company.

The car is built especially for exhibit purposes from designs prepared by Mike S. Hart, general manager of the commercial department of the Middle West Utilities Company. The car will serve as both a display room and traveling office. It resembles a standard baggage coach in exterior appearance, and measures 60 feet in length and weighs 40 tons.

Inside the car is installed a complete exhibition of lamps, appliances, fans, heating and cooking devices, etc., for demonstrating the conveniences of central-station service. The width of the car, 9 feet, permits of giving moving-picture shows for the education and entertainment of those who visit the exhibit. A portable screen is carried for this purpose. One end is fitted up as a new-business office with all the usual conveniences of an office of this sort.

For exhibition purposes in the towns where it is to be used, the car will be sidetracked in some convenient location where it will be accessible to the local public. Energy to operate the displays will be taken from the lines of the local system, sufficient cable being carried to make necessary connections. The car is, of course, without motors and will be attached to regular railroad trains for transfer from one display point to another. The accompanying illustrations show exterior and interior appearance of this car.

Exhibition Car With Electric Sign on Roof.

Interior of Exhibition Car.

NEW APPLICATIONS OF ELECTRICITY AS AN ADJUNCT TO NEW BUSINESS.[1]

By F. C. Caldwell.

A new electrical device needs no urging upon the central-station man if it is evident that it will be a large consumer of current. There is however, another angle from which an article should be viewed, which perhaps needs a little more emphasis. This is its usefulness to the customer. It is easily conceivable that an article which yielded an entirely negligible amount of revenue, but which would add to the attractivenes of central-station current and help to make it indispensable would justify an active campaign for its introduction. The identity of electricity and light occupies too large a place in the public mind. In the case of residences especially, much active educational work is needed to make house owners realize the many conveniences and comforts which properly go with the use of electricity.

One of these, which is most deserving, but which does not properly come within the range of this paper is the electric automobile. It should be looked upon as one of the great electrical prospects of the future, and treated accordingly.

New applications of electricity may properly be classified as based upon, first, electric heat; second, electric power; and third, other functions of electricity. These may be subdivided as used for residence or commercial work. The latter field is so varied that it will only be touched upon in this paper.

Taking up then the applications of heating, the flatiron, the toaster and the many other cooking devices that have long been before the public, but which are being constantly improved, must be passed over with only the remark that their present use is but a fraction of what it should be. These have invaded the field of heating and cooking at those special points, where, on account of its characteristics, electricity has offered special advantages. They have not, for the most part, been expected to entirely replace other means of cooking, but rather to supplement them. The past year or two, however, has seen the development of more pretentious apparatus, capable of entirely superseding the older form of ranges. Some of these have been put out in shapes which approximate closely their predecessor, the gas stove, the changes being in the substitution of electric for gas-flame heat and in the use of heat insulation. One of the larger of these, used for large residences, clubs, hotels, etc., consumes from 220 watts with the smallest heater, to over 10 kilowatts when the whole stove is in service. This type of range has the advantages that it departs little from the stove with which people are familiar, and that it does not necessitate anything different in the way of cooking utensils. Whether, however, these advantages offset the discarding of the more economical methods of cooking which the smokeless character of electric heat makes possible, is open to argument. One therefore finds a type of cooking appliance which may be described as similar to the recently popularized fireless cooker, but supplied with electric heating units. These of course conserve to a large extent the energy of the current, and make electric cooking practicable in families where less efficient methods could not be considered. These cookers may

[1]Paper read before the convention of the Ohio Electric Light Association, Cedar Point, July 16.

also be fitted with a radiant heater for toasting and broiling, or these processes may be performed by separate devices.

Thermostats may be provided with any form of inclosed cooker and these either maintain a constant predetermined heat, or cut off the current at a given temperature, allowing the completion of the cooking to proceed with the contained heat, as in an ordinary fireless cooker.

There may also be a field for a simple cooker, serving as a cross between the real fireless cooker and the electric cookers which aim to supersede the cook stove. The writer has built such a cooker, supplied with a 30 and 50-watt lamp, and controlled by a chandelier switch, in which a boiling temperature can be maintained, and which has proved very satisfactory.

It is needless to comment on the excellent character of the load offered by such cooking apparatus, and it would seem that the present is a propitious time to encourage its use, especially where the competition is with coal and artificial gas. The number of well-to-do families where, on account of the difficulty of obtaining satisfactory help, the women of the house do the cooking is increasing. Many such women have received a training which enables them to appreciate and make good use of the exactness of operation obtainable with electric equipment, and in such cases it is not economy, but conservatism, that would refuse to the workers in the kitchen every device that would lighten their task.

It is claimed that with an electric range electricity at four cents per kilowatt-hour will compete on a cost basis with gas at $1.00 per thousand cubic feet. With the cooker type even better results should be obtainable.

Another idea along this line is the continuously operated cooker, kept hot throughout the whole of the twenty-four hours. The makers of one cooker give the radiated energy as one kilowatt-hour per day, thus making the maintenance of a cooking temperature a matter of but moderate cost.

Turning next to other household heating devices, there are several of more or less recent introduction which should crowd the flat-iron and the toaster in the matter of popularity. One of the older of these, but still not nearly widely enough known, is the heating pad, which supersedes the rubber hot-water bottle. Wherever is found the invalid, the aged or the infant in the house, there is the heating pad a dearly appreciated comfort. But its usefulness is not confined to these cases; the occasional ache or pain, or even fatigue of the normally healthy is soothed by it. It serves also as a foot warmer on cold floors and as a bed warmer in cold weather.

The desire for outdoor sleeping which is at present becoming so wide spread is of special interest to the central-station man for he is in a position to add greatly to the comfort of its devotees. Besides the pad there are now on the market electrically heated blankets or quilts, which with an expenditure of about 50 watts, give a gentle heat, which makes the open air sleeper comfortable even on the coldest night. The writer being given to the practice, obtained one of these and found it very satisfactory. It is also useful for warming up the bed, though much slower in action than claimed by the maker. Thus with the air at 32 degrees and taking the average of the readings of three thermometers the temperature under the electric blanket rose from 36 degrees at the start to 51 degrees at the end of half an hour, 59 degrees at the end of one, 69 degrees at the end of two and 76 degrees at the end of three hours. It was then slowly rising. In this test besides the electric blanket there were two light blankets, two light quilts, a sheet and cover on the bed.

It is a question whether the electrical descendant of the old fashioned warming pan would not find a market. Indeed a device which is available for this purpose, as well as for a number of others, is on the market, in the shape of a combination blower and heater weighing about two pounds, which will deliver a stream of hot or cold air through a small opening. Some of the principal uses to which this is put are drying the hair, drying shoes on wet days before polishing and the treatment of various diseases.

A device to increase the usefulness of our old friend the flat-iron deserves mention. It is a little stand designed to hold the iron upside down, thus making it a hot place for cooking. A covered aluminum dish of the same shape as the iron is also provided, which by reducing unnecessary radiating surface considerably increases the effectiveness. This is especially recommended for travelers.

One of the recent comers into the field of electric heating is the water sterilizer. With the increasing caution practiced by the public in the matter of pure drinking water, the opening for such apparatus should be good. for many years the drinking water in the writer's home was laboriously boiled with gas and then cooled, the latter process often being more troublesome than the former. By using the hot boiled water to heat the cold raw water, one sterilizer, now on the market is claimed to sterilize water with electric heat at a cost of one cent per gallon, energy being 10 cents per kilowatt-hour. The process is entirely automatic. The raw water jar is filled and put in place and the current turned on. With the smallest size two gallons are sterilized per hour with an expenditure of 225 watts. The passage of the water depends upon its ebulition so that it is impossible for other than boiled water to reach the sterilized water jar. It is claimed that the time of boiling while ample to accomplish its object, does not deprive the water of its natural taste and that it comes out only a few degrees warmer than it enters.

An appliance that while not particularly new, deserves much wider use than it has yet enjoyed, is the radiant room heater. There is a popular idea that this is a very expensive means of heating, as indeed it would be if too much was expected from it. But where it is used as an auxiliary a d occasional source of heat, it is exceedingly convenient and not unduly costly.

A recent suggestion that should be popular, is the use of heaters for preventing tanks and water pipes in exposed places from freezing. An ordinary immersion heater could be used for this and could be applied to other purposes during moderate weather. The usé of the pipe-thawing transformers deserves passing mention, especially as a rather spectacular method of emphasizing the advantage of having electricity in the home.

On the commercial side, the opportunities for using electric heating are so varied that only a few general comments can be made. For almost every case where localized heat in small amounts is required, electricity can be used to advantage, and each industry within the range of supply of the central station should be studied from this point of view. Especial emphasis should be placed upon the convenience with which any required temperature may be exactly and continuously maintained. Electrically heated utensils, baths and furnaces are available in great variety and can be adapted to almost any requirement. In many cases such heating can be done as a strictly off-peak load.

Turning next to the power appliances and passing over such well known but all too little used devices as fans, sewing-machine motors, motor-driven washing machines, etc.,

the vacuum cleaners will first be considered. These, as is well known, are now made as portables in a great variety of styles and in a great range of prices, and while the best results can doubtless be obtained with the more powerful and high priced, some of the cheaper ones seem to be giving excellent satisfaction. There is a commendable tendency to install the fixed, or permanent type in the better class of dwellings. These being supplied with a stand pipe and openings on each floor, are much more convenient to use. So far they have only been built in such large sizes that they are too costly for ordinary dwellings. There would seem however to be no essential reason why a small outfit permanently installed with large piping should not give just as good results as where portable.

One of the most interesting and promising of the recent power developments is the Audiffren-Singrun refrigerating machine. The apparatus operates through the compression of sulphur dioxide. By an ingenious and simple construction the refrigerating and lubricating materials are hermetically sealed within a pair of drums; these are connected by the driving shaft, which is hollow.

It is stated that with current at six cents per kilowatt-hour and water at $1.00 per 1,000 cubic feet the refrigeration would be at the rate of 16 to 22 cents per hundred pounds of ice. In view of these figures and of the extreme simplicity of the apparatus, the lower limit of refrigeration requirement for which electrical operation becomes available, is certainly greatly reduced and only depends upon the price at which machines can be sold.

An application of power which is highly appreciated by housekeepers is the drying closet, used in connection with the laundry. This uses a fan to blow heated air through the closet. The heating is usually done with gas, though in both safety and convenience and in the dryness of the air, electrical heat would be much to be preferred. Such drying closets, built of steel can be purchased, but very good results can be obtained from an ordinary closet fitted up. The writer has had such a one in his own home for several years and it has proved most satisfactory.

The mangle, or ironing machine, motor-driven and with either gas or electrical heat is another laundry helper that deserves more consideration than it has so far received. Here again it is a problem of demonstrating its applicability to the ordinary household.

The use of an electric blower in the cold air flue of hot air furnaces is a practice which should by all means be encouraged. This eliminates all difficulties with the distribution of hot air through the house, regardless of weather conditions, and also by passing the air more rapidly over the heating surface considerably increases the heating efficiency of the furnace. This largely offsets the cost of current to run the blower. By this means the hot air furnace is made to approach the hot water system in reliability and economy, and to exceed it in convenience and healthfulness. Special blowers taking only 30 watts and designed for this purpose are now on the market.

Finally, to carry a thorough electrification of the household we have the kitchen power-table. This is a special table, upon which a motor is mounted with a suitable gearing for driving the meat grinder, egg beater, mixer, knife sharpener, apple parer, ice cream freezer and other similar kitchen utensils. But whether such a table be purchased or whether the same object be attained by the mounting of a motor and line shaft in the kitchen, it would seem only consistent to seek to use electric devices in the household for everything that needs to be driven.

The third classification given at the beginning of the paper was added to cover the only appliance still to be considered, namely, the ozonator. If all that is hoped for it is borne out by experience, this promises to be one of the most valuable applications of electricity of the present day. In it the air is passed by natural draft or by fan pressure between the ozinizing plates, and these are maintained at such a high difference of potential that a brush discharge occurs. In this way a considerable amount of ozone is produced and distributed through the air of the room. This ozone is an unstable form of oxygen and when it comes in contact with bacteria, organic matter, etc., a rapid oxidation of the same takes place, destroying their noxious qualities.

It is stated that much of the need for change of air by ventilation in rooms where people are congregated is due, not to the need for more oxygen, but to the necessity for getting rid of the poisonous organic matter and bacteria exhaled through the lungs, and that therefore, the ozonator by destroying this matter greatly decreases the amount of ventilation necessary. It is also very effective in eliminating offensive organic odors, such as are found in toilet rooms, leather factories, butcher shops, etc. It acts as a preservative, making higher temperature practicable in cold storage rooms. It is said to be very helpful in the treatment of certain diseases. Lastly, it has a wide and little known future in industrial processes where oxidation is required. As these ozonators only take 100 watts or less they do not form an important addition to the load, but such as it is, it is usually on for long hours.

In connection with these matters of electric appliances, two questions suggest themselves as worthy of consideration:

Is it not possible to put these appliances in the hands of the customer at a lower cost? When it is necessary to sell a device at three or four dollars which if manufactured and sold in such quantities as really ought to be used could probably be marketed for a dollar, and which, if sold, would bring in an annual income of two, three or more dollars, it would seem as though, from the point of view of the central station, there were room for improvement. Even however, if the central station were in a position to sell such appliances at cost, the matter would not be greatly helped. The manufacturer will claim that, on account of competition and frequent improvements, it is not possible to bring about such standardization as to materially reduce the cost. It would seem however, that the difficulty should be recognized and that a remedy should be persistently sought.

The second question is whether the policy of supplying customers, prepared to make considerable use of electric appliances in their homes, with a separate power and heating meter, or with a two-rate meter for off-peak and on-peak load should not be adopted more extensively than is at present the case.

With no changes in price, a vigorous educational campaign must in many cases result in greatly increased use of current for other lighting purposes, but such a campaign would be unquestionably greatly assisted if both appliances and power could be supplied at lower prices.

Growth in Worcester.

The Worcester (Mass.) Electric Light Company's gross output of electricity for the year ending June 30, 1913, was 22,189,900 kilowatt-hours as compared with 15,978,450 for the previous year. The output for June, 1913, showed an increase of 39 per cent over the same month in the previous year and a 23.7-per-cent increase in gross receipts.

Tennessee produced 18,483,173 pounds of copper in 1912.

Electrical Construction

THE KNIGHT PUBLIC FIRE-ALARM SYSTEM.[1]

By E. E. Moore.

This fire-alarm system has been invented and the apparatus designed to comply with the following requirements:

(1) Faults of any description on the line should make themselves known at the central station or be readily discoverable from there.

(2) Any one of these faults should, by simple manipulation at the station switchboard, be cleared so far as its effects are concerned, so that the alarm-points are still able to send through an alarm. The fault or faults may then be seen to at the first convenient moment, after which the circuit can revert to its normal state.

(3) Only the pulling of a fire-alarm handle, and nothing else, must give the fire signal at the station.

(4) The fire signal coming through should at once proclaim itself as a genuine fire-call. If more than one alarm-point is on a circuit the signal should then denote within 10 to 15 seconds of the start of the call the identical point which has been operated.

(5) It is an advantage for a code alarm to repeat itself, and a still further advantage for every alarm to record itself automatically.

(6) If more than one alarm-point is pulled at a time, there must be no confusion of signals, and yet no alarm must be lost by being automatically held up whilst a previous alarm is ringing in.

(7) The fire-alarm transmitter should be simple and positive in action. Once the operator has pulled the handle he should have no further power over the signal.

(8) When the transmitter has been pulled a bell should ring at the point, giving some idea to the operator that his signal is being transmitted. This bell should not ring unless the alarm signal is positively coming into the station.

(9) If telephonic communication is provided for the public to make use of, this should be arranged in such a manner that the telephone is not accessible for use, or cannot be brought into circuit, until the fire-alarm has been given and fully received.

(10) District calls coming into one station in large towns should be automatically transmitted to any other station or stations if necessary.

(11) It must be possible to add any reasonable number of new alarm points from time to time to the system. This should be done without necessarily running lines from the new point back to the station. Lines from the new point to the nearest existing point should be sufficient. A new point should also not entail any alterations or additions to the station apparatus, nor should it be necessary to put any part of the system out of order whilst the new point is being connected up.

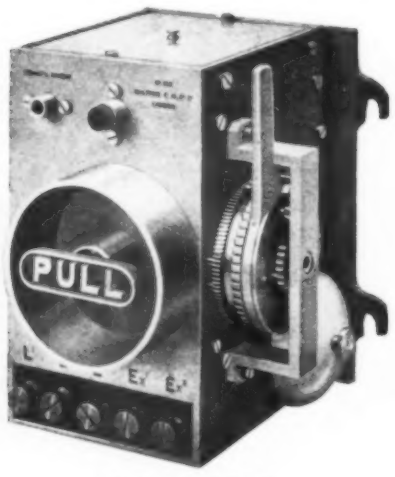


Fig. 1.—Transmitter.

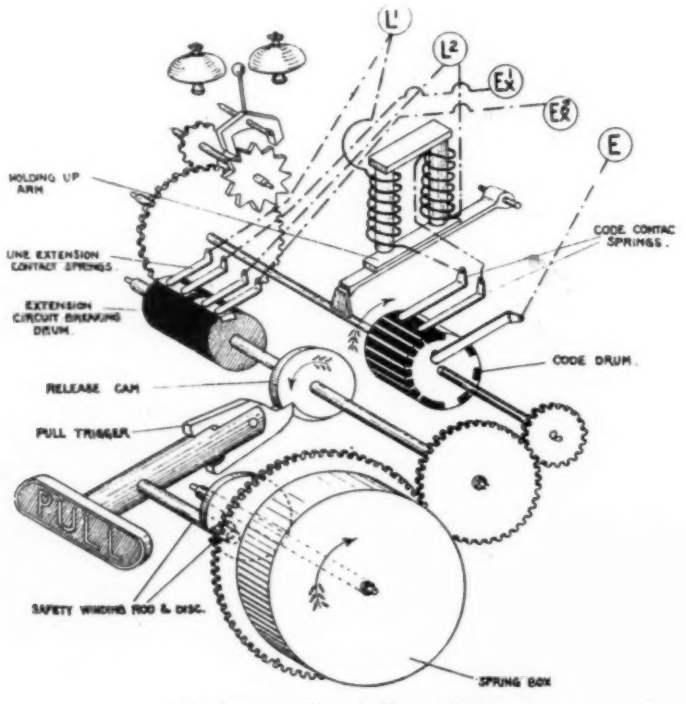


Fig. 2.—Connections in Transmitter.

The Knight Transmitter.

The actual appearance of a transmitter is shown in Fig. 1, while Fig. 2 is diagrammatic of the same, to simplify the explanation of its construction and working. The apparatus consists essentially of a small train of wheels capable of being driven by a spring which is inclosed in the spring-box. The clockwork is normally held in check by means of a release cam, which is solid with the release-cam axle and engages with the pull trigger. It will be observed that this trigger is pivoted at the inside end of the pull-handle rod. When the handle

1 From the *Journal of the Institution of Electrical Engineers.*

is pulled, the trigger is likewise pulled forward away from the release cam, thus leaving the clockwork free to revolve. As soon as the trigger is clear of the release cam it is so weighted that it tilts upwards, and no matter how quickly the pull-handle may be released and pushed back by its antagonist spring, it cannot stop the motion of the clockwork.

Fig. 3.—Alarm Box Closed.

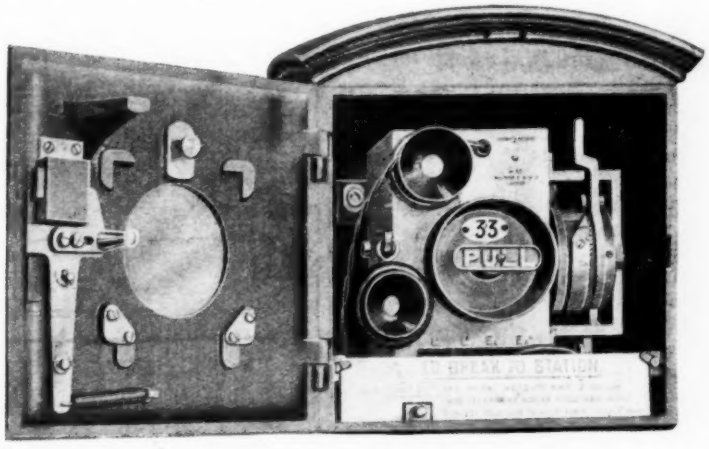


Fig. 4.—Alarm Box Open.

It will be seen that this pull-handle and rod have nothing to do except release the clockwork. They do not, for instance, wind up a spring when pulled, entailing the release of the handle before the clockwork starts. A snatch pull has the same result as when a person pulls the handle and holds it out or gives it a succession of pulls. Once the clockwork has started, the operator has no further power over the instrument. All that the public is asked to do is to "Break glass and pull handle.

Geared to the release-cam axle in the ratio of two to one is the code-drum axle, carrying the code drum solid with it. The periphery of the drum is divided into a number of metallic and insulating segments alternating with each other. Pressing on this surface are two code contact-springs. When the clockwork is released and the code drum revolves as each metallic segment comes into contact with the code contact-springs, these two springs are earthed through the frame of the transmitter. By suitable subdivision this code drum makes first a series of sharp regular intermittent contacts, and then follows a prearranged code made up a series of longer contacts.

When the code drum has made two complete revolutions the clockwork is stopped by the release cam again engaging with the pull-handle trigger. Should the handle now be pulled again, the result will once more be as first described. This is all the actual gear necessary to transmit the signals to the station; but among other things, provision has to be made for automatically holding up a signal should another post be in operation. For this purpose an electromagnet is provided, together with an extension circuit-breaking drum. This latter is on the same axle as the release cam. The holding-up arm operated by the armature of the electromagnet engages with a pin on the code contact-wheel directly the two contact-springs are earthed by the first metallic segment after the pull-handle has been operated. Unless the current then flows round the electromagnet coils and the armature is attracted, the clockwork is stopped. The circuit-breaking drum normally keeps two pairs of line-extension contact-springs respectively in contact; but when the clockwork stops revolving, and before the code contact-springs are earthed, the two pairs of line-extension contact-springs break contact electrically.

The further explanation of the method of holding up signals will better be understood when we come to consider the diagram of connections. The remainder of the small train of wheels is mainly for the purpose of governing the speed of the clockwork. The fastest revolving wheel operates an anchor pawl to which is fixed a bell hammer, so that when the clockwork is revolving, the hammer is vibrated and rings a bell. This bell forms the answering signal to whoever has sent the call, and gives him some idea that his pulling of the handle is having effect. As the battery is at

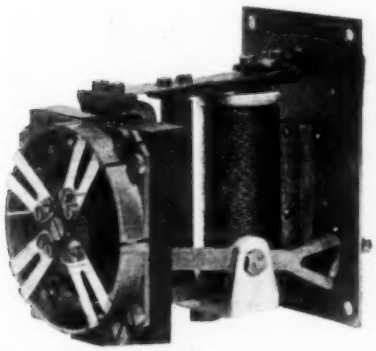


Fig. 5.—Circuit Changer on Switchboard.

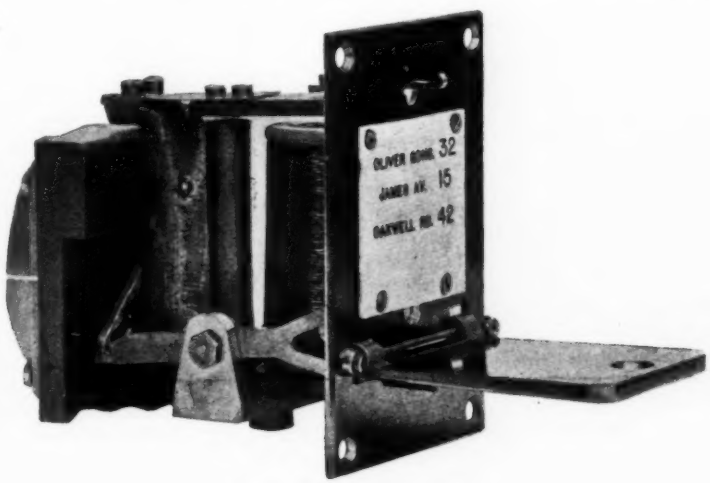


Fig. 6.—Switchboard Drop.

the station, the electromagnet in the transmitter cannot be operated and thus release the clockwork after the handle has been pulled, unless the signal has reached the station.

Telephonic communication is provided. With one pattern a jack only is fixed. In this case the firemen carry portable hand sets with them and plug in whenever they wish to speak to the station. The action of plugging causes the station to be rung up by a continuous ring, totally distinct from the regular warning intermittent ring given by the code drum. This method has the small advantage of doing away with the cost of fitting a telephone transmitter and receiver to every post, and incidentally minimizes any trouble which might occur on these in consequence of their being left in such a damp place as a street box. Against this there is the disadvantage of a portable hand set having to be carried about by anyone who wishes to get into communication with the station; and it also of course precludes the possibility of anyone else speaking to the station. It is no doubt an advantage to the fire brigade if, when giving the alarm, a person can supplement this alarm with some information regarding the extent and locality of the fire, but (and this is most important) the first and foremost object of an alarm system is to give the warning to the brigade that they are wanted at a fire somewhere. Once they have got this assurance, and whilst they are turning out, then a word or two of explanation over the telephone, if it can be given without delaying the starting of the firemen, is to be commended. When, therefore, the public is given the opportunity to speak to the station it should only be possible when and after the complete fire signal has been received at the station; and as the operator of the fire-alarm is generally in a more or less abnormal state of mind, only the simplest instructions should be in front of him to enable him to send the fire signal, without any confusing particulars of what he is to do in order to speak to the station.

In the fire alarm now being described, this practical requirement has been met in the following manner.

The only instructions which need appear on the outside of the box are "Break glass and pull handle." On the mainspring drum is fitted a projecting cam which, when the clockwork has run for a few seconds, engages with the bolt that holds the door of the box fastened, and unlocks it. The door is then pushed open by means of a spring plunger suitably fixed. The door having opened, another instruction tablet is disclosed, which gives sufficient particulars to enable the operator to use the telephone that is accessible only when the door is open. Fig. 3 shows this box before an alarm is given, and Fig. 4 the same box directly the complete signal has been received at the station.

The motive power to drive the clockwork is a strong spring. As stated above, the pulling of the alarm handle does not wind up this spring in any way, but only releases the clockwork. The spring must therefore be wound up by the fireman who replaces the broken glass; and it would of course be a very weak point in the system if by any neglect the alarm was left in an unworkable condition. The following simple arrangements are therefore made to provide against this.

On the pull-handle rod, and at right angles to it, is a projecting rod, while on this spring drum is a circular disc with a slot cut diametrically in it. This allows the end of the projecting rod to enter, and the pull-handle to go right home only when the spring drum is in a certain position, which is when the spring is wound up. At any other time the pull-handle is forced out a certain distance, so that if a careless man put a new glass in the door and tried to shut the door when the spring was not wound up, the handle would foul the glass and smash it.

The winding lever provided for winding the spring is fitted with a ratchet movement. A few down-and-up movements to this are sufficient to put the alarm in position again ready for another call. Should the winding lever not be placed back in position, the replacement boss on the door will automatically do this when the door is shut.

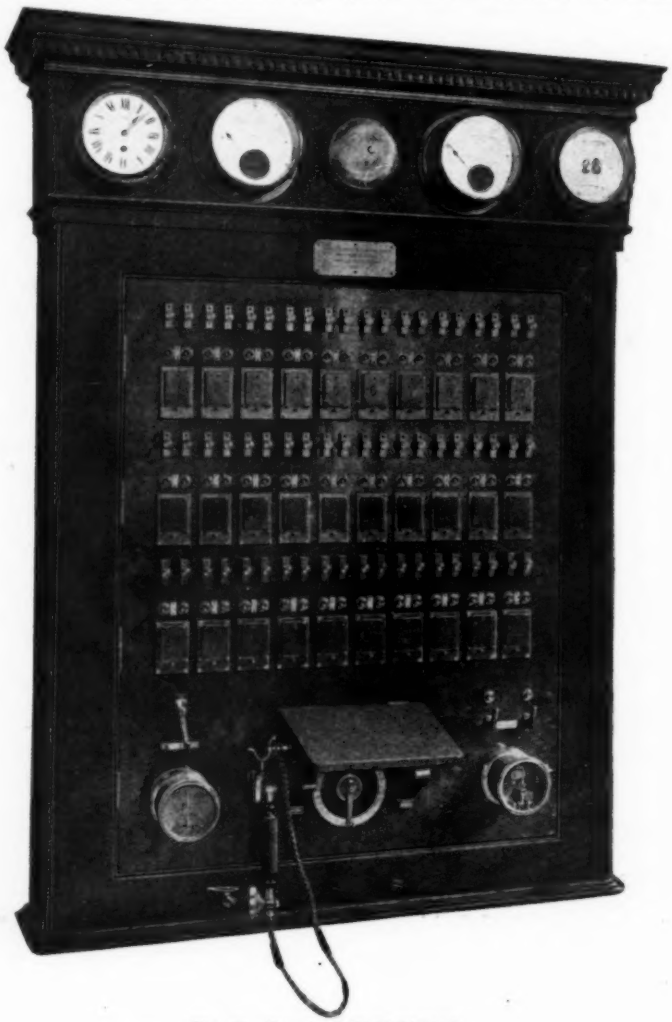


Fig. 7.—Front of Switchboard.

The spring drum, code drum, and extension circuit-breaking drum, being in solid mesh, will all revolve in a backward direction when the spring is wound up; and if no provision were made, would then send an erratic signal to the station and drop a flap there. Although this would not be recognized as a regular intermittent signal and fire-alarm, the necessity for dropping a flap at all is obviated by arranging a circuit-breaking lever operated by a cam on the winding lever, so that during the short process of winding, the code contact-springs

are lifted slightly off the code drum, and the circuit cannot thus be put to earth through it. A non-inductive resistance of 3,000 ohms is provided and connected across the extension terminals of the end post on a circuit. The telephone gear at the post consists simply of a microphone and a receiver. The receiver normally hangs on an automatic switch hook.

Station Switchboard.

The station apparatus calls for no special description in detail, unless it is the drop-flap annunciator shown in Figs. 5 and 6. With this system the dropping of a flap alters 3, 4, or even 5 circuits, according to requirements. Thus besides being merely an annunciator it has further most important work to do. As may be seen by referring to Fig. 5, a circular form of circuit-changer has been adopted. The drop-flap is arranged so that in falling it engages with an arm which rotates the circuit-changing contact-springs through a certain arc. This instrument offers various advantages for this class of work:

(*a*) The contact-springs or blades are always at the same pressure on the segments of the contact ring, and are therefore never liable to become "set"; which is always the case when a spring is bent backward and forward with or against its direction of pressure.

(*b*) The contact surfaces have almost no resistance, and being rubbing contacts are self-cleaning.

(*c*) There is no question of adjustment. If the flap is up, the springs must be on their proper segments; and when the flap is down they must all have changed over to their other segments.

(d) The weight of the flap acts only just in front of its dead center when in the up position; and as the flap does not engage with the lever which rotates the circuit-changer springs until it has fallen through an arc of about 25 degrees a very weak current energizing the electromagnet coil is sufficient to release it. Thus all the line current is called upon to do is to release the flap. It is the falling weight and leverage of the flap that supplies the energy to operate the circuit-changer.

Fig. 7 gives the general appearance of a switchboard for 30 circuits. If only five alarm-points are connected to each circuit this board therefore gives accommodation for 150 alarm-points.

(To be continued.)

The wireless telephone apparatus which Japanese officials of the Department of Communications are credited with having invented was successfully operated early in June, according to statements made by the parties concerned. From the Yokohama station limited conversations have been carried on with Japanese steamships as far distant as 60 miles.

CONVENTION OF NATIONAL ELECTRICAL CONTRACTORS' ASSOCIATION.

Thirteenth Annual Meeting Held at Chattanooga, Tenn., July 16-19.

The National Electrical Contractors' Association of the United States has just completed the twelfth year of its existence, and these twelve years have been years of steady growth in membership, and of constant, uninterrupted gain in influence and usefulness. Organized at the Pan-American Exposition, at Buffalo, N. Y., with 32 members, it began its fight to win for the electrical contractors that recognition as a most important factor in the electrical industry which is so necessary, and to bring about an era of education and concerted effort for the common good everywhere among men engaged in the electrical contracting business. This was a small beginning; but wise leadership and persistent effort have brought the Association to a place among the foremost of organizations of electrical interests. The annual convention at Chattanooga last week was of itself convincing evidence of this.

On Tuesday, July 15, the day before the opening of the convention, there was a meeting of the Board of Directors of the Association which was well attended and at which a large amount of business was transacted. Among other interesting facts brought out at this meeting was the fact that the membership of the Association is now 1,275, and that the organization is in much better condition financially than it has ever been before.

The initial session of the convention proper was called to order at eleven o'clock Wednesday, by President Ernest Freeman, of Chicago. In the absence of J. Pink Lawrence, who was scheduled to make the opening address, which was to be an address of welcome on behalf of the Tennessee State Association of Electrical Contractors, Joseph A. Fowler, of Memphis, a director of the National Association welcomed the visiting members and the guests of the convention. In words that were well chosen, Mr. Fowler declared that the Tennessee organization not only welcomed the National gathering but that it thanked the convention for coming to the State. He felt that the contractors of the State and section would be greatly benefited.

President Freeman responded to Mr. Fowlers' address. He spoke briefly of the historic interest which attaches to Chattanooga because of the battles that were fought in this vicinity during the Civil War, and dwelt at some length upon the assurances of genuine hospitality which the visiting contractors had observed from the moment of their arrival. He then introduced H. Clay Evans, who was followed by T. C. Betterton. Mr. Evans and Mr. Betterton are members of the governing board of Chattanooga, and their speeches were in the nature of a welcome to the city.

A. M. Schoen, electrical engineer for the Southeastern Tariff Association, of Atlanta, was the next speaker. His talk was a rather scholarly review of electrical development in modern times. He paid special attention to recent improvements in electric wiring, and told something of the origin and growth of the National Electrical Code. The address showed that the subject was one with which the speaker was familiar and that attention had been given to putting the facts together in an interesting and orderly fashion.

Mr. Schoen's address concluded the first session of the convention. The following sessions—one on Wednesday afternoon, one on Thursday, and two Friday—were all executive sessions and were open to members only. Annual reports of the officials of the Association occupied much of the afternoon session Wednesday. President Freeman delivered his annual address, which was cheerful and optimistic. It showed the progress of the organization since the last convention and predicted a great future for it.

The secretary's report showed, among other things, that the membership of the Association now includes substantial numbers from all parts of the country, and that the past year has been one of unusual growth and development.

John R. Galloway, of Washington, D. C., the treasurer of the organization showed in his report that the National Association had never been so well off financially before.

Mr. Morton Resigns.

A matter of unusual interest in the Wednesday afternoor meeting was the address of W. H. Morton, who tendered his resignation as secretary. He has been in this office since the Association was first founded, 12 years ago. He is known to every member, and there is probably not a more popular man in the organization. Mr. Morton, in tendering his resignation, stated that he was going to leave within a short time for Porto Rico, where he has organized a large company to exploit plantations there. He will retain the office until the time for his leaving for new fields.

A committee on resolutions, consisting of Ernest McCleary, James R. Strong, Gerry M. Sanborn and Mar-

shall L. Barnes, made a report and introduced a set of resolutions thanking Mr. Morton for the work that he has done while secretary of the organization. The resolutions detailed how his services had been invaluable, and that the association owed much to his hard work. Best wishes for him in his new field were also incorporated in the paper. By unanimous vote of convention Mr. Morton was made an honorary member of the Association.

The Executive Committee, of which Ernest Freeman, of Chicago, is the chairman, will appoint Mr. Morton's successor as soon as it can be sure that the best man available for the place has been found, going outside the Association for a secretary if this seems advisable. It was decided to make announcement in the advertising columns of some of the leading electrical magazines that the secretaryship is to be filled. It was stated that the office must be filled promptly, since Mr. Morton is to quit the place in September.

Some attention was given during the Wednesday afternoon session to certain National Electrical Code rules now in force, wiring in elevator shafts having come in for an unusual amount of discussion.

Mr. Wakeman Speaks.

A special feature of the Thursday morning session was an address by J. M. Wakeman, general manager of the Society for Electrical Development. Mr. Wakeman's address was devoted largely to the history of the society which he represents, and to a statement of its purposes and aims and what has already been accomplished through the organization. He spoke of the financial support and encouragement which the electrical manufacturers of the country are giving the Society at this time. At the conclusion of the address, there was considerable discussion and many questions were asked Mr. Wakeman, all of which he took pains to answer fully. During this discussion, it was brought out that prior to the Chattanooga convention, there were 33 electrical contractors who were members of the Society and it was stated that 26 of these were located in Chicago. At the conclusion of the discussion, 25 of the contractors present signed applications for membership in the organization. President Ernest Freeman pointed out that in thus bringing their membership up to 58, the electrical contractors were approaching the membership of the central stations in the Society rather closely.

Lecture on Illumination.

Thursday afternoon those attending the convention took an automobile trip through Chickamauga Battlefield and across Missionary Ridge, this trip taking up the afternoon. At seven o'clock that evening there was a lecture on illumination by T. H. Aldrich, of Chicago. Mr. Aldrich confined his remarks mainly to show-window lighting, although he spoke briefly of lighting of other kinds. He said that window is well lighted in which the merchandise on display is so illuminated as to stand out clearly and distinctly without a thought arising in the observer's mind relative to the manner in which the window lighting is accomplished. A show window can be compared to a stage setting in several ways. Just as the scenic artists strive to produce the most attractive setups, so does the window dresser strive to produce the most attention-compelling windows of which he is capable. The window trimmer gives consideration to the color of the background, the height of the background, the placing of the merchandise in the best position, so as to obtain the proper perspective when viewed from the sidewalk. Care is also taken to see that one piece of merchandise does not cast a shadow on another. The nature of the goods on display should to a certain degree determine as to the location of the lights, and the type of reflectors to be used. Take a jeweler's window, for example, which is usually narrow, the average depth of which is about four feet; also a large proportion of the goods on display are laid in a flat position at the bottom of the window; in such windows the light sources and reflectors can be best situated on the ceiling nearer to the windowpane than to the center of the window. If the window is very narrow, the lights can be placed in the center of the window satisfactorily. In most jeweler's windows, a concentrating type of reflector is best adapted.

Ernest Freeman,
President of National Electrical Contractors' Association.

There is something more than a hit-or-miss plan of laying out the outlets and deciding on the proper reflectors for different show windows. The proper intensity of light required for show window lighting, must be determined, in a way, by local conditions, such as the size of the city, importance of the street, amount of light in use in the adjacent windows, nature of goods on display, whether of a dark or light color, etc.; intensities of from 10 to 40 foot-candles are to be found.

In small towns where the standard of illumination is low, outlets can be placed two feet to four feet apart, and smaller lamps used than in the larger cities, where the practice is to place outlets from 12 inches to 24 inches on centers and use higher candlepower lamps.

Mr. Aldrich's lecture was fully illustrated with lantern slides, by means of some of which he showed how to select the proper type of window reflector from the line manufacturered by the National X-Ray Reflector Company, for which he is supervising engineer.

The speaker contended that the merchant should make his show-window lighting a separate matter from exterior or sidewalk illumination. If he wants a bright sidewalk or building front to attract the public to his store he ought to install either an electric sign, an arc lamp or Mazda clusters in front of his store, these to be placed higher than the windows, so as not to interfere with the window lighting. It is bad practice to install bare lamps in the window to try to attain attraction to the store.

Jovian Rejuvenation.

Following the lecture by Mr. Aldrich Thursday night there was a Jovian rejuvenation at which a class of 19 initiates was inducted into membership in the Order. A. Harvey Ball, of Raleigh, N. C., was in charge of the exercises. The rejuvenation was followed with a buffet dinner served to all of the large number of Jovians attending the convention.

Addresses by Messrs. Robertson and Miles.

During the session on Friday President Freeman introduced W. E. Robertson, of Buffalo, N. Y., who addressed the contractors present as a representative of the Electrical Supply Jobbers' Association.

In substance, Mr. Robertson said the jobber used to find an important market among telephone men, but now the telephone companies are being merged into large corporations which buy from the manufacturer rather than from the jobber. There is a similar tendency among the central sta-

tions of the country, now that the smaller operating companies are rapidly becoming parts of the large corporations. It appeared, therefore, that the jobber must look more and more to the electrical contractor as his principal customer. The jobber was ready to turn over the business of the large industrial plant to the electrical contractor as soon as he could be sure that the contractor was in a position to handle it in the best possible way.

The speaker went on to point out that the credit of the electrical contractor with the jobber had greatly improved since the National Electrical Contractors' Association had been taking an energetic interest in the contractor's affairs. This improvement was largely due to the fact that the Association had taught its members to insist on fair profit for whatever they sell, whether it be supplies or service. Mr. Robertson emphasized the fact that the electrical jobber is heartily in favor of sound merchandising principles; he does not believe in selling his goods otherwise than at a reasonable profit. The jobber is anxious to co-operate with the contractor in every possible way, and he knows that such co-operation means increased business and better profits for both. It is a lack of co-operation in the proper degree that is now causing many jobbers to engage in retail selling, a business which properly belongs to the dealer.

The speaker closed by complimenting the National Electrical Contractors' Association on its splendid leadership and by warning the members of the organization to keep in mind the common good of the contracting fraternity rather than be over-zealous in the matter of gratifying personal ambition. The talk was delivered in a forceful, clear-cut way, and was one which was obviously followed with a great deal of interest.

P. L. Miles, of the National Quality Lamp Division of the General Electric Company, was another speaker during this session. His theme was "Advertising and Its Benefits in the Electrical Contracting Business." He spoke at some length of the value of show window advertising and discussed the best methods of using the window for the display of electrical goods. He then told of results which an electrical contracting concern had secured by systematic campaign of advertising among prospective customers. The method of procedure had consisted in securing a list of good prospects for the sale of electrical goods from the local central station and approaching these through circulars, newspaper advertising, and personal soliciting. The first step had been to send attractive attention-compeling circulars to prospective customers; this was followed with newspaper advertising, and finally solicitors were sent out to make personal calls. The sales resulting had proved exceedingly satisfactory.

Group of Visitors from Convention at Chickamauga Battlefield.

Entertainment.

In the matter of entertainment the Chattanooga convention was one that is certainly very seldom surpassed. There was something well worth while in the line of pleasure every day of the four. Wednesday it was a dance and cakewalk, at Hotel Patten, beginning at 8 p. m., with Mr. and Mrs. Ernest Freeman and Mr. and Mrs. Joseph A. Fowler serving as the committee in charge. Thursday came the automobile trip through Chickamauga and other battlefields. Friday there was an afternoon tea for the ladies, at Hotel Patten, at which there was delightful music and similar entertainment all the time. That night the convention banquet was held. And Saturday, from nine in the morning till seven in the evening was taken up with an automobile ride to the top of Signal Mountain, luncheon at Signal Mountain Inn, a ride back over Waldron's Ridge to the Union Station in Chattanooga, and a trip on a special train to the Tennessee lock and dam, some 25 miles away.

An additional word concerning the convention banquet is well in order here. Of the 220 folks who had registered at the convention headquarters up to Friday night 198 were present at the banquet. Extra tables had to be spread after the feed had begun. There was a substantial course dinner, with instrumental music and singing which began almost as soon as the banqueters had assembled and continued at frequent intervals throughout the evening. J. R. Strong, of New York, led the singing—and everybody sang, "America," "Dixie" and numerous other newer popular songs being sung with such inviting zest that even the negro waiters were observed to join in whenever opportunity offered itself. Contractors from Chicago and Detroit added considerably to the liveliness of the occasion with songs and yells of a local kind. The Chicago delegation had organized with leaders of the cheering, and their cheering for Chicago and Freeman was far from badly done. Their demands were so insistent that President Freeman was finally compelled to mount a chair and make a short speech.

Toward the conclusion of the banquet John Bivens, of the Edwards Supply Company, recited a long German dialect story in a way that proved particularly clever and amusing. Then followed a short vaudeville show, which closed the entertainment.

In the partial telegraphic report of the convention which appeared in these columns last week mention was made of a reception tendered contractors on their way to the convention by the Electrical Contractors' Association of Cincinnati. The contractors entertained in Cincinnati reached Chattanooga Wednesday morning on a special train enthusiastic over the good time shown them by their Cincinnati brethren.

Other Convention Notes.

The next convention of the National Electrical Contractors' Association is to be held in Detroit, Mich.; the exact date has not been fixed.

Ernest Freeman, of Chicago, was re-elected president of the Association without opposition. The members at Chattanooga were unanimous in their commendation of his services as president of the organization during the past year. Other officers of the Association are: J. C. Hatzel, New York, first vice-president; W. L. Hutchison, Kansas City, second vice-president; J. C. Rendler, Los Angeles, third vice-president; John R. Galloway, Washington, D. C., treasurer; J. C. Sterns, Buffalo, N. Y., sergeant-at-arms; W. H. Morton, Utica, N. Y., secretary, whose successor is to be appointed as previously noted.

Electrical Manufacturers and Dealers Represented.

Quite a number of electrical manufacturing and supply concerns had representatives at the convention, and some of these had exhibits of their products. Among those noted were:

The Frank Adam Electric Company, of St. Louis; represented by Fred Adam.

Appleton Electric Company, Chicago; represented by J. E. Mair; exhibiting line of Appleton fittings for interior wiring.

Consolidated Glass & Lamp Company, Corapolis, Pa.; represented by B. H. Hagedorn; exhibiting line of reflectors and shades.

Electric Goods Manufacturing Company, Canton, Mass.; represented by Charles B. Fitts; interior telephones and signal apparatus.

General Electric Company; represented by H. R. Sargent.

Harter Electric Manufacturing Company, of Chicago; represented by G. A. Harter; exhibiting line of reflectors.

W. N. Matthews & Brother, St. Louis; represented by Victor L. Crawford; exhibiting high-tension line disconnection switch, lamp changers, cable clamps, etc.

National Metal Molding Company, Pittsburgh; represented by F. S. Montgomery and C. W. Abbott; showing line of new metal molding fittings, samples of Sherarduct and Economy conduit, etc.

The National X-Ray Reflector Company, of Chicago; represented by T. H. Aldrich; exhibit consisting of a line of show-window reflectors, reflectors for industrial plants, equipment for interior lighting, etc.

Simplex Wire & Cable Company, Boston; represented by W. F. Hruby; showing new type of rubber-insulated wire for overhead work, steel-taped cables for underground circuits, etc.

The Sprague Electric Works, of the General Electric Company; represented by E. B. Kittle, of Chicago, and H. H. Hornsby, of New York.

The Trumbull Electric Manufacturing Company, Plainville, Conn.; represented by J. S. Jacobson; showing new lines of snap switches, and a new insulating joint with slotted hickey; presented guests at convention banquet with silk handkerchiefs having Trumbull monogram in corner.

Western Conduit Company, Youngstown, O.; represented by J. Gleason; exhibiting line of Buckeye rigid conduit, both galvanized and enameled, and samples of "Realflex" flexible steel-armored cable.

Westinghouse Electric & Manufacturing Company; represented by Samuel Stocking, Jr.

Western Electric Company; represented by John H. Pearson.

Program of Convention of California Association of Electrical Contractors.

The fourth annual convention of the California State Association of Electrical Contractors will be held in Santa Barbara, Cal., August 13 to 16. The following is the convention program:

Wednesday, Aug. 13.

10:00 a. m.—Business meeting, members only.

2:00 p. m.—Sight-seeing trip for ladies and visitors to the far-famed Old Mission of Santa Barbara.

3:00 to 5:00 p. m.—Reception for the ladies at Mrs. Loveday's residence.

8:00 p. m.—Reception and dance.

Thursday, Aug. 14.

10:00 a. m.—Business meeting, members only.

2:00 p. m.—Motor trip for ladies and visitors through the picturesque Hope Ranch, over some of the most beautiful mountain roads in the country.

4:00 p. m.—Ball game in Santa Barbara Ball Park, between the Supply men and the Contractors, for the cup won by the Supply men at the last convention.

8:00 p. m.—Moonlight boat ride.

Friday, Aug. 15.

10:00 a. m.—Open meeting.

2:00 p. m.—Open meeting.

At the open meeting a number of very instructive papers will be read.

2:00 p. m.—Ladies' motor ride to Montecito and Miramar.

7:00 p. m.—Annual dinner in the Moorish room, after which the guests will adjourn to the ball room.

Saturday, Aug. 16.

9:30 a. m.—Baseball game between the Northern and Southern Contractors for the cup won by the Northern Contractors at the last convention. At the conclusion of the ball game the entire party will be taken to Oak Park, where one of Santa Barbara's famous barbecues will be served at 1 p. m. All kinds of games for prizes.

7:30 p. m.—The Statesmen of California will hold a Rejuvenation of the Sons of Jove. For the ladies the management of the hotel will give a concert in the lobby by La Monaca's celebrated band. After the concert and rejuvenation a "Dutch Lunch" will be served in the ball room.

For those who wish to stay over Sunday, arrangements are being made to take a fishing party to Santa Cruz Island, where lunch will be served, returning to the Potter Hotel in time to catch trains.

Change of City Electrician in Omaha.

M. J. Curran has been appointed city electrician in Omaha, Neb., to succeed Waldemar Michaelsen, who resigned several days ago. Mr. Curran is a practical electrician and has been engaged in the electrical contracting business in Omaha for some time past.

There were few better known electrical inspectors in the West than Mr. Michaelsen, and, withal, very few who were so popular in the inspection field as he. For several years he has been a prominent member of the Western Association of Electrical Inspectors, and at the annual conventions of this body, one which he never missed, his good judgment, fine sense of humor, and readiness as an impromtu speaker made him conspicuous and popular. All the inspectors knew "Mike" and liked him. The fact that he has resigned to enter the commercial electrical field is one that will be learned with very general regret among electrical inspectors.

Registration to be Required of Chicago Contractors.

Several weeks ago mention was made in these columns of an ordinance then pending in the city council of Chicago to require the registration of persons who supervise the installation of electric wiring and apparatus in the city. Originally the proposal was to require that any man in responsible charge of the installation of electrical work pay a fee of $100 per year to the city and that he produce affidavits from two reliable persons showing him to be a competent electrician. Before the ordinance came up for final hearing, however, rather strenuous objection was raised as to the amount of the proposed fee. Resultant reductions finally brought the fee down to $25 for the first payment, with the provision that $10 must be paid at the expiration of each year for renewal of registration. With these amounts as the fees, and with the other provisions remaining in substance as the ordinance was originally drawn, the measure has become a law.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Connection for Flat Iron.

A tailor in the writer's town who uses electric flat irons in all his work used to be bothered very much by the flexible cord which supplies current to the iron getting in his way and making the iron clumsy to handle. The arrangement illustrated in Fig. 1 removed the difficulty very satisfactorily. On a smooth wire stretched over the table where the ironing was done some solid knobs were loosely threaded, and the flexible cord was fastened to these.

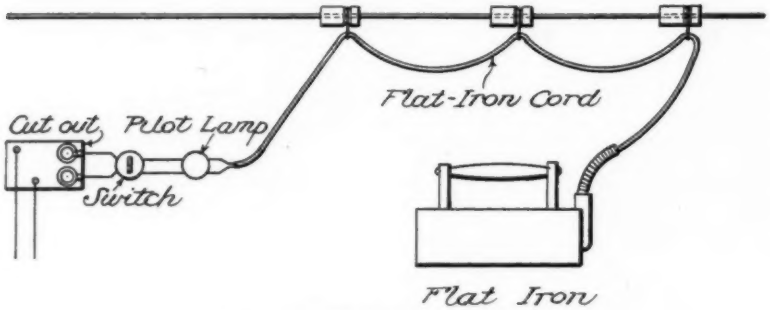


Fig. 1.—Method of Supporting Cord.

Thus the cord is kept out of the way, and, at the same time, the iron can be readily carried into any desired position.

M. J. Morriarty.

How to Straighten Wire Quickly.

In order to do a good neat job of open work, it is quite important to have the wire free from all kinks. When they have become bent and crooked by careless handling, or when second-hand wire is being used, I place the smaller wires, such as Nos. 12 and 14 over something round, like the rung of a ladder, and draw them back and forth until they are perfectly straight. The larger wires I straighten in the following manner: First I select a good, solid floor or cement walk; here the wire is stretched out, and a man at each end takes hold of fifteen or twenty foot lengths at a time, both raising the wire from the floor or walk at the same time, and then bringing it down together with a good deal of force. When this operation is repeated several times it will be found that badly bent and crooked wire of large size can be made as straight as when new.

I have known of a great deal of time being saved and neat work being done by the use of the above suggestions.

W. A. Hines.

Cutting Holes in Service Boxes.

In running service pipes into the cabinet which is to contain the service switch and fuse, it is sometimes advisable to bring the pipe in at the back or bottom of the box. Wiremen frequently have trouble in cutting the proper sort of hole for the service conduit. I find that a neat, round hole can be cut by using a cold chisel and keeping it so inclined to the bottom of the box that only the corner of the chisel will cut.

F. Husar.

Motor Driven Winch.

It seems to be a time-honored custom to use an old, rusty, handpower winch for all work on underground conduits. Fig. 2 shows how one man broke away from the custom.

The sketch needs little explanation. An ordinary framework was built. On this the motor and winch were mounted. The motor is a single-phase unit. Current for such a motor can generally be obtained in the manhole where the work is being done and is supplied through a flexible cable of the proper length and size.

The drawing shows a belt drive, but in reality gears are used in order to make the rotation of the winch slow enough. An idler is blocked in the manhole and the drawing rope passed through this; then through another shown on the drawing and finally over the winch. One man at the winch and two at the feeding-in manhole can manage such an equipment. The outfit certainly looks like a good investment. While designed for power lines, there seems to be no reason why it could not be used for most work on telephone conduits run underground.

Richard E. Smith.

A Quickly Made Drill Chuck.

Having occasion to drill some one and an eight-inch holes for receptacles in a back-connected panel board, by hand, we found we could not hold the big, tapered shank of the drill in any brace or tool to get steady pressure to drill the slate. We therefore made a

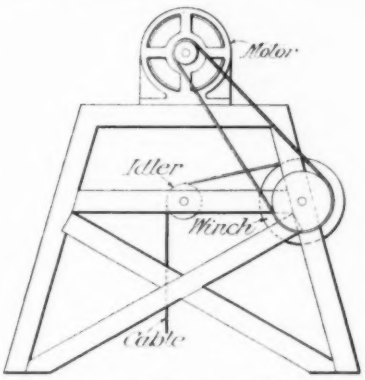


Fig. 2.—Motor in Position.

chuck of hard-wood block and a three-eighth-inch bolt, and it worked like a charm. It took only fifteen minutes to make this and it saved hours of waiting. Fig. 3 explains its simplicity. The block was a 2.5-inch cube, and we countersunk the head of the bolt 1.5 inch in the block and enlarged the hole the size of the drill shank. We found that the bolt could be easily held in an ordinary brace.

This plan could also be employed if the shank of the drill was smaller than the head of the bolt. The block could be made in two parts; the bolt would

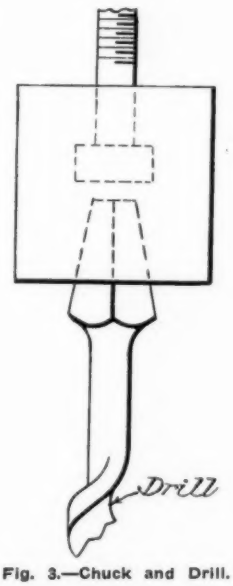


Fig. 3.—Chuck and Drill.

then be fastened in one piece and the chuck in the other, and the pieces finally fastened together with screws.

Ben R. Browne.

Public Service Commissions

CALIFORNIA.

The Railroad Commission has rendered a decision granting authority to the San Joaquin Light & Power Corporation to issue $1,776,000 of bonds. It was also given authority to pledge these bonds for an issue of two-year, six-per-cent collateral-trust notes. The proceeds from the sale of the bonds or notes are to be used by the company in completing its power houses, substations and transmission lines in connection with its new hydroelectric work.

The Santa Barbara Gas & Electric Company was given authority to issue bonds in the sum of $100,000, to be used for making extensions to the company's plant in the city of Santa Barbara.

The Commission has rendered a decision denying the application of the San Diego Consolidated Gas & Electric Company to issue 3,148 shares of its common capital stock of the par value of $314,800. The corporation applied for authority to issue the stock to pay the discount on its bonds issued since March, 1909.

MISSOURI.

William F. Woerner, a lawyer, has been appointed on the Public Service Commission, thus completing the membership of the Commission.

NEW YORK.

The Long Island Railroad Company and the New York Consolidated Railroad Company have been ordered by the Public Service Commission for the First District to equip each of their electrically operated cars with one or more chemical fire extinguishers of such a type that the contents thereof cannot act as an electrical conductor. The cars must be so equipped by September 15, and if any other kinds of fire extinguishers are used, such other extinguishers must be conspicuously labeled that they are not to be used until the current has been shut off. This action was taken following an investigation into a recent accident upon a trestle at Jamaica where a car of the New York Consolidated Company caught fire and was destroyed. It was found that the car had carried no fire extinguishers whatsoever.

OHIO.

The Cleveland Electric Illuminating Company has been authorized by the Public Service Commission to issue common capital stock of the par value of $2,000,000 and first-mortgage five-per-cent bonds to the amount of $1,000,000. The proceeds are to be devoted to the payment of existing indebtedness incurred for improvements and extensions and for similar work yet to be carried out.

The Sandusky River Power Company has been authirized to issue its six-per-cent general-mortgage notes in the sum of $75,00 to be sold for not less than 90, the proceeds to be used for improvements and changes made necessary by the high waters in the Sandusky River last spring.

OKLAHOMA.

The Oklahoma Supreme Court has allowed the Pioneer Telephone Company a supersedeas in its appeal from the order of the Corporation Commission requiring the company to refund to subscribers in Oklahoma City the sum of $62,057.27, representing the amount of the increase put into effect by the company without permission of the Commission, from June 1, 1911, to December 31, 1912. The commission's order as issued requiring the money to be paid over by July 15. The Commission denied a rehearing and refused a supersedeas, but finally agreed to allow the matter to stand without further action until the Supreme Court should decide whether or not an appeal would lie from the Commission's order.

The controversy arises out of the Commission's order prohibiting rate increases without its permission. The Pioneer Company raised rates in Oklahoma City without regard to that order and was fined for contempt. The Supreme Court on appeal sustained the authority of the Commission, both in regard to the original order and in the contempt proceedings. The matter has since been pending before the Commission and several unsuccessful attempts have been made to secure an amicable settlement.

The Commission has issued an order requiring the Pioneer and the Jefferson County Telephone Companies to make physical connections of their toll lines at Addington until a time when a final adjustment of a basis for the division of the tolls between the independent line, which is mutual, and the Pioneer can be agreed upon. The Commission does not attempt to fix any basis for division of tolls, but merely orders that good service be given to subscribers in the town and on rural lines. The complaining company alleges that after the installation of its exchanges in Addington and a rural system a contract was made with the Pioneer by which it was to receive 10 per cent of all tolls; that on August 1, 1912, that contract was abandoned by agreement and that from that time to April 25, 1913, it received 25 per cent of the tolls. On the latter date it is charged that the defendant without notice disconnected its toll line and installed its own switchboard in the outskirts of the town.

WISCONSIN.

The Wisconsin Railroad Commission has given its decision in the matter of the complaint of the City of Green Bay, alleging that the rates charged by the Green Bay Gas and Electric Company for gas and electric service are excessive. An analysis of the cost of rendering the service in this case involved the consideration of several joint utilities and associated companies. The entire property has been treated by the Commission as if it were owned and operated by a single concern, for the purpose of eliminating inter-company revenues from the calculations and further to permit of a single schedule of charges to apply to consumers of all the associated companies in lieu of the several different schedules now in effect. The property under consideration was given a present value of $2,373,457 and a cost of reproduction of $2,788,875. The investigation revealed the fact that the present revenue from the electric service is less than the cost of operating the hydroelectric plant, if a fair allowance be made for interest and depreciation, and that, furthermore, the cost of generation by water power is greater than it usually costs to privide the same service by steam power. An estimate of the expenses of the plant, using steam

power, showed that the costs of the electric utility on this basis would be lower and would be about the same as the revenues have been. On this account and for the further reason that the amount of business which the respondent now has is not sufficient in comparison with the size of the plant to reduce the unit fixed costs to an amount that the Commission considered proper as a basis for fixing rates, it was not considered advisable at this time to make any change in the earnings of the electric department.

However, the present diversified schedules were ordered abolished and the following schedule was prescribed: primary rate, 10 cents net per kilowatt-hour for the first 30 hours' use per month of the active connected load; secondary rate, 8 cents net for the next 60 hours' use per month; excess rate, 4 cents net. The minimum bill was fixed at $1.00 per month. The active connected load is to be a fixed percentage of the total connected load. In class A, consisting of residences, 60 per cent of the first 500 watts is to be deemed active and 33.3 per cent of the excess. In class B, consisting of banks, offices, stores. shops, depots, etc., 70 per cent of the connected load is to be considered as active. In class C, consisting of public buildings, schools, churches, hotels, clubs, small industrial establishments, etc., 35 per cent is to be active. The rate for sign and window lighting is to consist of a charge of 5 cents net per active 50-watt lamp or its equivalent per month and an energy charge of 4 cents net per kilowatt-hour. In this class all lamps are to be considered active.

No alteration was considered advisable in the present power rates nor in the rates for street lighting. The present revenues from the gas department were large enough to warrant a reduction in rates, and the following schedule was ordered: first 1,000 cubic feet per month, $1.15 net; second 1,000 cubic feet, $1.05 net; next 3,000 cubic feet, $0.95 net; all over 5,000 cubic feet, $0.90 net. The gross rate is to be one cent higher, the difference constituting a discount for prompt payment. The double meter system was ordered abandoned and no distinction is henceforth to be made between gas sold for fuel and for illuminating purposes. The companies affected by the order are the Green Bay Gas and Electric Company, the Green Bay Traction Company, the Northern Hydro-Electric Company and the Wisconsin Public Service Company.

The Commission has handed down its decision on the petition of citizens of Lake Geneva alleging that the rates charged by the Equitable Electric Light Company are excessive. The present rate is 15 cents per kilowatt-hour with a rate of 10 cents for large consumers. In connection with the cost analysis, the Commission presented the following table of normal costs and the comparison with similar costs at Lake Geneva:

UNIT COSTS IN CENTS PER KILOWATT-HOUR OF OUTPUT.

	Lake Geneva	Normal
Power	3.14	2.49
Distribution	0.95	0.35
Consumption	0.01	0.14
Commercial	0.16	0.12
General	1.27	0.55
Undistributed	0.53	0.15
Total operating exp.	6.06	3.80
Power lost and unaccounted for, per cent	38	28

The high cost of service was shown to be due, among other things, to an inefficient plant equipment and to the high standard of service demanded by the summer or out-of-town consumers. For the reason that these consumers demand a grade of service not usually rendered by a utility the size of the respondent's, the Commission did not include them in its prescribed schedule. The schedule ordered for the consumers in the city of Lake Geneva will effect a slight reduction in rates, and is as follows: primary rate, 14 cents net per kilowatt-hour for the first 30 hours' use per month of the active connected load; secondary rate, 12 cents per kilowatt-hour for the next 60 hours' use per month of the active connected load; excess rate, 8 cents net. The classification according to active connected load is the same as that noted above in the Green Bay decision, except that in class B the active load is to be 70 per cent of the first 2.5 kilowatts and 55 per cent of the remainder. The minimum bill is to range from a charge of 60 cents per month where the connected load is one kilowatt or less to a charge of $2.25 for a connected load of 5 kilowatts or over. The summer-resident consumers will continue to pay under the old schedule.

The power schedule in effect at present ranges from 7.5 cents to 4 cents per kilowatt-hour. This will be discontinued and the following schedule substituted: a service charge of 75 cents per active horsepower per month; an energy charge consisting of a primary rate of 5 cents net per kilowatt-hour for the first 50 hours' use per month of the active horsepower, and an excess rate of 3 cents net. The percentage active is to be determined as follows: 90 per cent of the first 10 horsepower; 75 per cent of the next 20 horsepower; 60 per cent of the next 30 horsepower; 50 per cent of all over 60 horsepower. The above schedule will effect a slight increase in the revenues from commercial power.

The Commission called attention to the fact that the respondent's sales have not been developed to the point which they would have reached under a lower or more satisfactory rate schedule, and the schedules prescribed are planned to develop business, as they have done in practically every case heretofore acted upon by the Commission, by offering an inducement to both small and large consumers to use a considerable amount of energy.

INTERSTATE COMMERCE COMMISSION.

The Oklahoma Corporation Commission has filed a complaint with the Interstate Commerce Commission against the Pioneer Telephone and Telegraph Company, the Southwestern Telephone and Telegraph Company of Texas, the Home Enterprise Telephone Company of Oklahoma and the American Telephone Company, alleging that they are controlled by the American Telephone and Telegraph Company and asking that they be required to establish rates and connections with the Arnett Telephone Company of Arnett, Okla. It is claimed that prior to July 12, 1912, the companies made connections with the Arnett Company for the different points served by them, but that since that date they have refused to allow the Arnett Company to make connections with them. The Corporation Commission alleges that the refusal was brought about by the American Telephone and Telegraph Company.

This is said to be the first case where a state commission has sought the aid of the Interstate Commerce Commission to force one telephone company to establish through rates and connections with another.

Boston Street Lighting.

The Boston Finance Commission has recommended to the City Council that the proposals of two gas lighting companies to furnish street lighting in that city be rejected and that electricity be employed to a greater extent than at present. The Commission says:

"If the efficiency of the tungsten lamp can be doubled, without extra cost, as the General Electric Company's recent public announcement indicates, the city would not be justified in continuing the use of gas lamps for street lighting unless a large reduction in the cost of gas should be made in order to meet the competition of the improved electric lamps."

Exports of Copper.

Exports of copper for the week ended July 17 amounted to 7,436 tons; since July 1, 15,384 tons; same period last year, 18,372 tons.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No 142.—Allowance for Reduced Maximum Demand in Summer.—Recently I read an article explaining a rate system used by a British central station in which the number of hours charged for at the primary rate was less in summer than in winter, so as to compensate for the reduced maximum demand and decreased lighting load in summer and to encourage the use of electricity for cooking. Is this system in use anywhere in this country?—F. D., Racine, Wis.

No. 151.—Copper Wire Base.—Will some one kindly explain how the base on copper wire is calculated from standard spot or electrolytic copper quotations? If the wire base is not calculated from these quotations, kindly explain how it is calculated.—R. L. L., Minneapolis, Minn.

No. 156.—Theater Wiring.—In wiring for the lighting of the auditorium of a theater is it ever required to have all these lighting circuits controlled from both the electrician's switchboard on the stage and from the box office, or does the box office control only the special emergency lights?—H. W., Springfield, Ill.

No. 157.—Forming Storage Battery Plates.—In electrochemically forming storage-battery plates direct from the lead what acid is the best to use? Has the use of nitric acid for this purpose been so perfected as to make its employment safe? Is reversal of the plates after first forming them always necessary?—F. B. E., Chicago, Ill.

Answers.

No. 150.—Meters Outside the Building.—Is the installing of meters on the outside of buildings under verandas considered good practice? Would frost have a bad effect on the mechanism of the meter?—R. M., St Catharines, Ont.

Some four or five years ago when meters were first installed on rear porches here the writer was somewhat opposed to the practice, but since has found that no bad effects were produced, as long as they were protected from the rain and snow. We have had some severe weather in this section of the country, too. When meters are so set here, we connect them in circuit ahead of the main switch and fuse, having special permission from the underwriters to do so. The heat from the shunt winding is sufficient to prevent any damage from frost. I know of one place in central Iowa where a meter has been in service on a porch for three years, with protection on top and sides only, the face and bottom being exposed to the weather; when tested this meter compared favorably with those that had been used inside. Personally I prefer to put the meter in a cabinet, if it has to be on the porch.—F. H. P., Indianapolis, Ind.

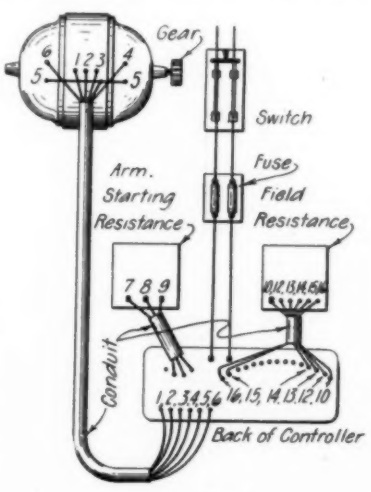
Installing meters under verandas would be considered impractical for various reasons: Very unhandy to read, and again they would get covered with dust and cobwebs, part of which would undoubtedly work inside of meter. During rainy period, water would drop on and inside of meter, and when the frosty season is on, a meter with ice on the disk has a poor chance of recording. Installation of meters is the business that I am engaged in, and I find that the rear hall or basement is the most suitable place to locate a meter. In either of these places the meter is easy to read, test, etc., without the difficulties of excessive dust and dampness.—E. P. W., South Framingham, Mass.

In this locality the practice of placing meters on verandas, particularly on back porches, is considered good construction. Of course this only applies to residence districts and more to the bungalow than any other style of house. The chief advantages are ease of access to the meter reader and that the amount of unfused wires between the fuse cabinet and the point of entrance of the feeders is reduced to a minimum, it being customary to mount the meter immediately above the cutout cabinet. No bad effects from frosts or variations due to heat or cold are noted, but of course we have not the extreme cold that would be encountered at St. Catherines, Ont.—B. F. W., North Yakima, Wash.

The installation of meters outside of buildings on verandas is an excellent practice. It has been found a time saver for the central stations that have adopted this system. It is, however, not a general practice, even though objections are few and advantages many. Consider what a lot of time is saved by a meter reader when he can go from meter to meter without gaining entrance to the building. And then when he turns in his readings at night there are no pickups to go back on the next day and possibly the day after. Also what grumbling and consequent ill feeling towards the service company it saves the lady of the house or servant when there are no tracks left by the meter readers' dusty or muddy shoes. Another advantage is that the meter is not so apt to be tampered with when others besides the consumer can observe such proceedings. The only objection to installing meters in the open is when these must be tested in winter. But it can usually be so arranged that these tests will fall during warmer seasons. If something goes wrong during the winter the meter can be brought in to the testing room and straightened out. The temperature does not seem to have any appreciable effect on electric meters. In my experience I have never known frost to affect them any. It is, however, a good plan and costs very little to install such meters in cabinets with glass doors. The cabinets can either be set on the outside or built in flush as desired. In new buildings the general contractor will build these cabinets while house is being erected.—B. J. L. Battle Creek, Mich.

No. 152.—Motor Trouble.—I am having trouble with a double-commutator Commercial motor and controller. Both were taken down for repair and it is possible that tags marking the terminal wires were not put on properly. At any rate, I have failed to get the machine properly connected again. The manufacturers of this motor are out of business and I am unable to get a connection diagram from them. Can any reader furnish such a diagram?—T. N. P., Connersville, Ind.

The accompanying two sketches will solve the motor trouble for T. N. P., I believe. There are several types of controllers put out by the old Commercial Electric Company for its double-commutator variable-speed motors, but the diagrams herewith were the ones most extensively used. All motors and controllers sent out had their terminals stamped with figures as shown in Fig 1, and no mistake should be made in reconnecting them, unless the numbers on the studs were in some manner worn off or removed. In this case Fig. 2 will give the connections to operate the motor properly. Your trouble may not be in



No. 152.—Fig. 1.

the connections, but in the brushes; the brushes on both ends should be set exactly in the same position, otherwise the motor will not operate as it should and will give endless trouble. This same motor was also built shunt-wound and, of course, used a different type of controller from the one shown in Fig. 2.—F. H. P., Indianapolis, Ind.

No. 154.—LIGHTNING RODS.—Has copper any advantages over iron wire for lightning rods?—W. S. C., St. Joseph, Mo.

The result of extended inquiries on the subject of lightning rods properly placed and constructed leave no room for doubt that they afford an efficient protection to buildings on which they are placed. To insure this protection, however, the following conditions must be generally insisted on in order to permit the rod to act properly: (1) the rod, whether of iron or copper, should be of such size as to enable it to carry without fusion the heaviest bolt it is liable to receive in the locality in which it is located; (2) iron is a better substance for a lightning rod than copper, because on account of skin effect it is equally as good a conductor as copper for very rapidly alternating currents, and is more difficult to fuse and less subject to corrosion; (3) great care should be exercised in the grounding of all rods so as to make the rod reach to permanent moisture—this requirement is of paramount importance to the proper action of a lightning rod and unless thoroughly fulfilled may render the rod worse than worthless, regardless of how carefully the other requirements are attended to. A copper tape is better than a copper rod because a rapidly periodic current whose periodicity is sufficiently great passes practically over the surface of the conductor only; moreover, considering the electric discharge as taking its energy from the surrounding dielectric, a tape is better for the reason the surface which absorbs the energy is greater in the case of a tape than of a solid rod.—W. E. R., Boston, Mass.

I believe that copper has the advantage over iron wire for lightning rods, as it is a better conductor, and does not rust as iron does. Copper, while more expensive, is easier to put up than iron of the same size and in all ways would be better than the galvanized wire we get nowadays. I know of a case where No. 4 galvanized iron and 5/16-inch strand were used, and in less than two years they had both rusted out, and could be broken by the hand very easily; they were, however, exposed to considerable coal smoke. Copper would have withstood this much better.—F. H. P., Indianapolis, Ind.

[The following extracts from a lecture on "Lightning Protection of Buildings" by Dr. Berg (published practically in full in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN, of November 16, 1912, pages 938-940) are of interest on this subject.]

"Electrical Constants of Lightning Rods.—It is generally recognized that a lightning discharge is oscillating and that the oscillations are of high frequency, perhaps from 100,000 to several million cycles per second. At these frequencies the electric constants of conductors are very different from those normally.

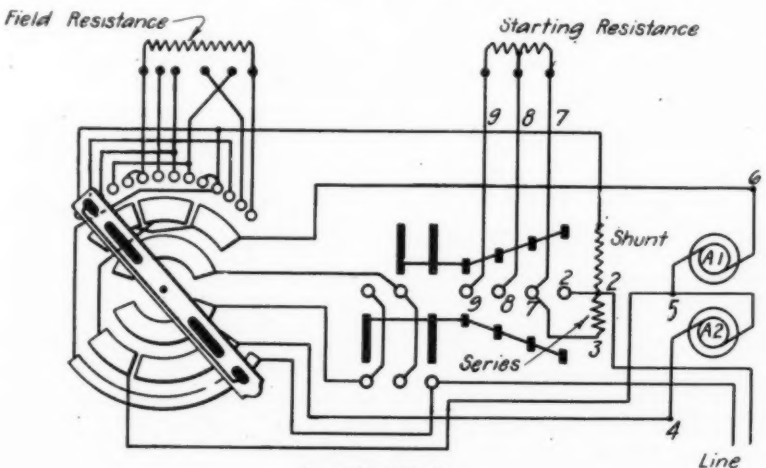
"In the passing of high-frequency currents, energy is expanded as heat at the surface of the conductor and in electric radiations in the surrounding space. The resistance, which depends upon the conductivity and the cross-section of the rod, is of no importance; even the shape of the conductor, which is of much importance with frequencies from 100 to 100,000 cycles, is of relatively little importance at frequencies from a million to ten million cycles.

"The same applies to the inductance of the conductor; it is also practically independent of the kind of material or its section. It is evident from this that, provided the lightning discharge in the rod is a high-frequency oscillation, from an electrical point of view it matters really very little whether copper or iron, flat or round, stranded or solid conductors are used; though to be sure there is a slight advantage in flat ribbons, at all but the highest frequencies.

The object of the lightning rod is to form a path for the discharge, a path offering much less obstruction than any path through the building. If the resistance were all-important, this could well be done by using a very large copper rod, but at these very high frequencies the impedance is measured in tens or even hundreds of ohms, whereas the resistance may be but a small fraction of an ohm.

"What kind of material should be used?—In cities where, after all, the damage by lightning is small, where there is always more or less fuel gases and soot in the air, copper seems best. But I can see no electrical advantage in having a stranded cable; a solid rod is as efficient. In the country galvanized-iron rods seem best for two reasons. First, they are cheaper; second, their electrical constants are if anything better than those of copper. Again an apparent paradox is met. It has been said that the material, size and shape of the rod was rather immaterial and yet now iron rods are recommended. The reason is that the first statement applied to the ability of the rod to discharge the current with the least drop of potential, whereas other factors also enter, factors which, to be sure, are of secondary importance.

"The old idea that the rod carries the electric charge to earth and that that is the end of it, is fallacious. The earth is one plate of the condenser, the cloud the other, and whatever energy is stored between them has to be consumed in some way. It is done by heating the rod and by sending out electric radiations. The higher the resistance of the rod the greater is the energy converted to heat, thus the smaller are the number of oscillations of the discharge current necessary to dissipate the energy. Iron has considerably higher effective resistance than copper, thus iron has an advantage. Perhaps the point will be clearer by stating that as far as impeding the flow of the current is concerned, the resistance of the rod is immaterial as long as it is at all reasonable; as far as affecting the duration of the discharge is concerned, however, the higher the resistance the shorter is the time and the less violent is the disturbance."



No. 152.—Fig. 2.

Cable from Portugal to Panama.

The Portuguese Government has authorized the laying of a submarine cable from Portugal to Panama. It will touch the Madeira Islands and also several of the West Indies. A French syndicate is back of the project.

Ohio Electric Light Association.

Report of Annual Convention Held at Cedar Point, July 15-18.

The nineteenth annual convention of the Ohio Electric Light Association was held at the Hotel Breakers, Cedar Point, on July 15, 16, 17 and 18. The convention was a very successful one and the attendance broke all previous records, the total registration amounting to 476. A lively interest was shown in all the sessions, and especially those at which addresses were made by Mathias E. Turner, S. G. McMeen and James V. Oxtoby. The commercial session held on Wednesday also developed much interest and the discussion on the papers presented showed that the building up of new business is a live topic with all the central stations.

The weather during the convention was delightful and greatly added to the enjoyment of the social features. As usual the Association gave a banquet to all those attending. This was given on Wednesday evening and included an entertainment prepared by members of the Electrical League of Cleveland. Dancing, preceded by a musicale, was provided for Tuesday and Thursday evenings. On Wednesday afternoon a waterball game between teams representing the active and the associate members, respectively, resulted in a tie, the score being 9-9. On Thursday afternoon the central-station men won the cup offered for the baseball game by winning with a score of 7 to 2.

Additional entertainment was provided for the ladies in the form of card parties, a launch ride and a bowling party.

On Thursday evening the Jovians held a rejuvenation and initiated a number of new members. A special degree team went from Cleveland for this purpose.

Opening Session.

The first session of the convention was called to order by President J. C. Martin at 2:40 p. m., on Tuesday. While Mr. Martin was making his presidential address, Past-president W. C. Anderson was called upon to occupy the chair.

President Martin greeted the members and remarked upon the growth of the Association, which now numbers 90 associate members and 102 active members, representing 60 per cent of the privately owned plants in the state. He then referred to the influence of the Association upon the general public, saying: "We are not engaged in the marketing of a commodity which we can sell or withhold at our pleasure, or whose price as an article of commerce is subject to our dictation. We are acting in a sense as a branch of the state in furnishing to its people a product which has now become indispensable to the comfort of the home and to the safety of the community. How keenly alive is the public to this relationship is shown in the active efforts in this and other states within the past few years to place our business under a system of supervision and control by state bodies, and in some instances in the attempts to lay upon us burdens and restrictions which would be well-nigh ruinous. It is evident, therefore, that the primary aim of our meetings is not the promulgation of ideas which shall result in greater revenues or greater savings to the member companies, but it is that together we may hear suggestions and arrive at conclusions which shall result in a more efficient and diversified service to the public. Our most valued members are not necessarily those who can exhibit in their annual reports the largest net earnings, but those who, while amply protecting the holders of

J. C. Martin,
President of the Ohio Electric Light Association.

their securities, can boast of having rendered to their patrons a service that has called forth their commendation. It is evident, too, that the attacks upon public utilities which we have recently witnessed can have but scant basis of success so long as the privately owned utility faithfully discharges its obligations to the public from which it derives its powers."

He then referred to the work of the Association committees and to the damage done by the flood. "The remarkable rehabilitation in Dayton is but typical of the courage and energy with which the managers of the private plants throughout the state met the emergency; and the rapidity with which these plants resumed service, as compared with the municipal plants, furnishes a striking contrast in the comparative value of the two modes of service to the community."

The growing tendency toward consolidation of small plants and syndicate management was pointed out, with the attendant advantages to the public. The work of the Advisory Committee before the State Legislature was then explained. The local control of public utilities was eliminated from the Mills bill and the act as finally passed is an improvement over the original utility law, although it does not afford the protection to the companies or the people secured in other states. This provision for local regulation sprang up in numerous bills and had to be fought at every turn. The Legislature enacted a workmen's compensation act affecting every company with five or more employees, and elminating casualty insurance companies from the state.

In the future the decisions of the Public Service Commission, and the appeals, which, as now provided, shall be made to the Supreme Court of the state, will become authoritative, and will govern and control the questions as between the public and the member companies. Hence it is essential that the members of the Association should lend mutual aid and assistance to each other in these matters, and that the Association should see to it that all questions that are new, novel or fundamental should be properly decided. Very often the smaller company is not so fortunate as to have regularly retained counsel, or the counsel that it may be able to secure in its local community is wholly unversed in the technique of the science. For that reason these matters become very largely matters of mutual interest, and should be regarded as Association problems.

The matters referred to in the president's address were then thrown open for discussion. The discussion was concerned with the matter of obtaining legal talent to contest any cases coming up in Ohio, which might be carried to the Supreme Court of the state and set precedents which would affect the entire central-station industry of the state. It was felt that such cases should not be left to the small companies to fight alone, as their resources might not be sufficient to make the best presentation of the case. W. Parsons, D. L. Gaskill, C. I. Crippen, L. Beecher and J. E. Miller participated in this discussion. Mr. Parsons moved that a committee of five be appointed by the president to consider the matter. This motion was amended so as to leave the matter in the hands of the Executive Committee with power to act.

Mr. Parsons then moved a vote of thanks to President Martin, Secretary Gaskill and Mr. Scovil in looking after the Association's interests during the past year. This was carried.

The report of the secretary-treasurer was then presented by Mr. Gaskill. This showed receipts for the year ending July 4 of $5,465.85, disbursements of $6,006.37 and a balance due

to the treasurer of $540.52. The dues of the Association, which have not been altered for 18 years, are now out of proportion to the benefits received, and they should be increased. It was suggested that in place of the souvenir program a monthly bulletin be published. This would cost about $2,100 per year. The arduous work of President Martin was also referred to.

This report was referred to the Finance Committee for audit.

The report of the Executive Committee was then presented by Secretary Gaskill. It recommended the election of four applicants for active membership and five applicants for associate membership; also the establishment of the monthly bulletin proposed by the secretary. This publication should give decisions of the Public Service Commission and other matters of interest to the members. Two amendments to the constitution were proposed, one increasing the dues and another providing for engineering members.

The committee named W. F. Hubbell and W. J. Hanley as members of a nominating committee and the membership elected M. E Turner and S. M. Rust. The fifth member of this committee, F. M. Tait, was appointed by President Martin.

The applicants for membership were elected and action on the amendments deferred until Thursday.

The Advisory Committee had nothing to report.

The report of the Insurance Committee was then presented by Mr. Gaskill. The committee has been seeking to secure reduced rates, and has shown them justified by the statistics of the 65 companies reporting. Of these 27 carry no insurance, while the other 38 carry insurance amounting to $2,373,250. The annual premiums amount to $23,382. In five years this amounts to $116,910, while the total losses in five years have amounted to only $672 or 0.57 per cent of the premiums. Although classed as hazardous, power stations are evidently among the safest risks. No satisfaction has been secured from either the Ohio Inspection Bureau or the Chicago Board of Fire Underwriters, and relief seems possible only through mutual insurance such as is now available through mutual companies which include only utility properties. A committee of the State Legislature is now investigating insurance matters and it was proposed to this committee that a State Insurance Commission, with authority over rates, be created. This report was accepted.

President Martin remarked that there were three rating bureaus in the state, those at Cleveland and Cincinnati having only local jurisdiction, while that at Columbus controlled the rest of the state. The latter receives over $70,000 from the insurance companies, and appears to act as a buffer between them and policy holders, thus shifting responsibility for the high rates.

The report of the committee which considered affiliation with the National Electric Light Association was presented by Mathias E. Turner. Affiliation was not regarded as advantageous at the present time. This report was adopted and the session then adjourned.

Electric Ranges.

An additional session was held in the evening at 8:30, at which an address was made by Mathias E. Turner on "Cooking by Unity-Load-Factor Electric Ranges." This was accomplished by a demonstration of the apparatus recently perfected by the General Electric Company on the Therol system. This apparatus takes current continuously and stores the heat in huge masses of cast iron until it is desired. A large quantity of heat can then be abstracted for a rapid cooking process. Four pieces of apparatus were demonstrated. These consisted of two electric storage stoves taking 2.61 amperes; one storage steamer taking 1.75 amperes; and an electric oven taking 2.17 amperes, all at 115 volts. The oven has connected with it a boiler in which current is employed only during the cooking operation. When current is switched into the broiling unit an equivalent heating unit is cut out of the circuit so that the total load remains the same. The storage stoves open at the top and disclose a hot plate upon which the cooking utensils are placed. It is only necessary to keep the utensil here for a short time in order to transfer to it sufficient heat to complete any ordinary cooking process, such as frying, bringing water to a boil, griddle cakes, etc. The steamer differs from the stove in having a deep recess under the lid in which a large pot can be placed for boiling vegetables, etc. This pot has three compartments, enabling three vegetables to be cooked at the same time independently. The lid of the steamer can be closed over this receptacle.

Mr. Turner opened his address by referring to the difficulty with the frying pan and griddle on ordinary electric stoves, none of which have been satisfactory in this respect. The stove now presented will do anything that is required in the kitchen, as the temperature attained is much higher than that in any other form of electric stove. It also avoids the common fault of inability to cook quickly. He outlined the development work which had been carried on by the General Electric Company and the result which had been attained in securing a high temperature without using excessive current. The stove exhibited was suited to the use of a large family. While the fireless cooker has a field in serving small families, it does not fill the requirements of large families. The maximum heat attained by the cast-iron blocks is 1,100 degrees and it is possible for them to deliver heat when required at the rate of four kilowatts. The oven attains a temperature of 600 degrees Fahrenheit. Only a small number of these stoves have been made and they will not be placed upon the market in quantity, but only built to order.

Commercial Day.

Wednesday was known as Commercial Day and the session, which was called to order by Past-President W. C. Anderson at 10:10 a. m., was devoted to new business and the retention of old business. The first paper presented was one by Thomas F. Kelley entitled "Retention of Business of Dissatisfied Customers." This paper will be found in our last issue.

President J. C. Martin opened the discussion by referring to the importance of the subject, and called upon the members present to give their experience of the methods employed in handling cases of this kind.

The discussion was concerned principally, however, with the question of credits and what guarantee should be required of new customers that bills would be paid. Weare Parsons did not favor recognizing a telephone call as an application for service. Little time need be lost in investigating the credit of the applicant and getting the regular written contract signed. Twenty-four hours is sufficient to make connections and take all proper precautions. He considered the subject of credits the most important element in the success of the central-station business.

O. D. Welch favored sticking strictly to rules governing such cases. He realized, though, that such stringency often resulted in a distinct loss of business.

W. C. Anderson stated that in Canton connections were sometimes made upon a telephone call and he did not favor being too strict in applying the credit rule. No deposit is required in that city if the applicant is the owner of property or can give satisfactory reference. He thought that a friendly attitude should be cultivated.

Samuel Scovil considered this procedure dangerous since it was likely to give the impression that all customers were not treated alike. He thought all

rules should be lived up to strictly and the public should understand that there is no playing of favorites. If each customer is handled according to the judgment of the credit man it is likely to result in distinctions and ill will.

L. C. Anderson stated that in Middletown a deposit or a statement of ownership of property is required. While there is a state law specifying that no deposit shall be required from freeholders, this was not interpreted so as to prevent the utility company from using its discretion. He inquired what percentage of accounts was lost in Canton, to which W. C. Anderson replied that this percentage was between 0.50 and 0.75 and was mostly due to failures of commercial or business concerns. The losses through small consumers were insignificant. In Middletown, however, there is a different class to deal with, since there is a large floating population of mill hands who are general users and formerly produced a large percentage of losses. The guarantee system was found to be a failure since the company did not find it easy to collect from the guarantor.

W. A. Wolls thought that past payments constitute a good criterion for passing upon credit.

Mr. Parsons stated that since guarantees had been adopted in Springfield there was a better feeling than when deposits were required. The losses in that town had been less than 0.1 per cent.

J. E. North thought the credit question should be handled as it is by other commercial concerns. There should either be some guarantee of payments or else a deposit should be required.

J. C. Martin explained a method described at the convention of the National Electric Light Association and used in a city which had formerly required deposits. Now this company has a man in each section of the city who familiarizes himself with the customers and conditions. No arrears are permitted and no deposits or guarantees are required any more. There is a very small percentage of loss. The company meets its customers half way and treats them as merchants handling any other form of merchandise. It is assumed that customers are honest until they have demonstrated otherwise.

E. A. Bechstein did not see how a floating population, such as was met in Sandusky, could be handled except by deposit or guarantee. He considered it easier to have a set rule for all customers and give uniform treatment.

J. E. North then presented a paper entitled "New Business." This paper will be found on other pages in this issue.

In opening the discussion on this paper President Martin called attention to the importance of the subject and stated that while statistics show that the business of the electric companies is rapidly increasing, the new business of railroads and manufacturers is decreasing. He considered it important to get manufacturers to tell their power troubles to the central station, which could often find a solution.

Thomas F. Kelley agreed with the author that it is not advisable for solicitors to take time to make out daily written reports, but there should be an oral interchange each morning. He favored advertising in theater programs. He had found it effective to get in touch with the personal interests of prospects and talk to them about their hobbies. This was often the entering wedge for a contract. He considered the proposal in the paper to establish a standing committee upon the subject of new business a good one and made a motion that the president should appoint three members to select such a committee. This motion was later passed.

M. E. Turner did not think it was good salesmanship to talk to prospects about their hobbies and other matters not directly concerned with taking orders. Prospects frequently guide the conversation away from the question of power by this means and it is best to stick to the subject.

E. A. Elliott agreed with Mr. Kelley on the question of attacking the prospect through his hobbies and that notes of an individual's interests should be made and filed for future use of solicitors.

B. E. Edgar stated that he had had the same difficulty as the author in regard to persons signing applications for extensions in order to assist a neighbor and later on taking the service. In reply to a question, Mr. North stated that the Public Service Commission had made no objection to the form of contract used in Springfield in this connection and that there had been no difficulty in collecting each month the $1.50 specified in the contract to be paid until the premises were ready for service.

J. C. Martin explained that this form of contract is not to be regarded as part of a schedule of rates but was a payment in consideration of the expenditure of funds by the company for the extension of the line. He also explained the method of handling solicitors which he had observed at Chicago. Consultation of all solicitors was held at least once a week and a smaller number met every day to discuss conditions and methods.

W. T. Edmondson stated that in Alliance the solicitors met every morning and laid out a campaign for the day. They report the number of calls made, and on Saturday afternoon a meeting is held which meter readers and other company employees who may be interested are invited to attend. He agreed with Mr. North that theater programs are not very valuable for advertising purposes. He regarded electrical signs as second only to power in importance for producing revenue.

F. C. Caldwell then presented a paper entitled "New Applications of Electricity as an Adjunct to New Business." This paper will be found elsewhere in this issue.

In opening the discussion President Martin spoke of the importance of exploiting new ideas and as an illustration referred to the purification of city water supply by electrical treatment. He thought this offered future possibilities of a very desirable load. The method of purifying water by ozone had been tried in Baltimore and Ann Arbor and was in extensive use in Europe. The installation necessary is cheaper than for chemical treatment and it is a very desirable load for the central station on account of the high load-factor.

F. M. Tait thought rural districts should receive more attention, since they offer possibilities for load in the form of power, lighting, electric vehicles, pumping, fertilization of the soil by fixation of nitrogen, and stimulation of growth electrically. He thought refrigerating apparatus suitable for use in a small home an important development. He told of a desirable electric-furnace load which consisted of a furnace for melting down scrap brass, which used four kilowatts and was in operation only between 10 p. m. and 4 a. m.

M. E. Turner regarded the sterilization of water as an important point and felt that it was coming into general adoption. He moved that a committee of three be appointed by the president to investigate and report upon the application of electricity to water purification and this motion was passed.

F. C. Caldwell stated regarding sterilization that pathogenic bacteria are destroyed by being brought to the boiling point and it is not necessary to boil for 20 minutes, as sometimes recommended by the health officials. This period is specified merely to be on the safe side.

M. W. Franklin then gave a long talk upon the use of ozone for water purification. Ozone has been largely used in Europe for this purpose and destroys all bacteria and organic impurities in the water, leaving no odor.

taste or color. St. Petersburg has been trying this method for three years with a daily capacity of 12,500,000 gallons and is now about to increase this capacity five times. Paris, Madrid, and Venice are other cities making use of the method, which is spreading rapidly. The failures which have been recorded in several American plants have been for financial reasons rather than due to any technical difficulties. He then referred to installations for purifying air, in which ozone performs the same function as in water. It also gives the same effect of stimulation felt in fresh air. This is not due directly to the presence of the ozone but to the destruction of the organic matter which is the cause of staleness. Big ozone installations are now being made in a number of theaters. A large glue factory which is objectionable to the neighbors was cited. The fumes in this plant are collected in a large chimney and the ozone is injected at the base of this chimney. It oxidizes the organic matter so that no bad odor now results. Tanneries and other industrial plants can thus be made entirely unobjectionable. An important industrial application of ozone is in bleaching and this will probably be done entirely by the new method in the future, as it is much superior to the use of bleaching powders, which contain chlorine. Cotton, linen and silk are now bleached by this process, although its application to wool has not yet been perfected. Flour mills and breweries are also using ozone for bleaching purposes. It has another important application in the preservation of food in cold-storage warehouses. For many articles it is not advisable to carry the temperature below four degrees centigrade, and this does not kill the bacteria but checks their development. By passing ozone into such a closed room the bacteria can be entirely killed. In reply to a question he stated that the cost of applying this process in St. Petersburg was $8.55 per million gallons. The cost in Paris is somewhat higher and the figure will of course depend upon local conditions.

George D. Smith then presented a written discussion by H. W. Hillman on the development of the electric-vehicle business. The successful methods instituted in Baltimore, Md., and Hartford, Conn., for increasing the sales of electric trucks were described and it was recommended that the Ohio central stations take up similar methods for increasing this form of load. Modern methods are necessary for introducing this use of electric energy, and the electric-vehicle salesmen cannot do a great deal without the co-operation of the central stations. The latter can do a great deal of missionary work in this direction.

J. C. Martin pointed out that the production of gasoline is not keeping up with the consumption and the wholesale price has now risen to 19.5 cents per gallon. The steady increase in the price of gasoline makes the prospects for the increasing use of the electric vehicle very good.

The paper by H. E. Armstrong, which was schedued for this session, was postponed until the next day.

Thursday Session.

The session on Thursday morning was called to order by President Martin at 9:45 o'clock, and the program was opened with the paper by H. E. Armstrong, entitled "Means of Developing and Diversifying the Present Load." This paper was abstracted in the issue of July 19.

In opening the discussion, Secretary Gaskill told how the paper came to be prepared, and stated that there were other ways of developing the load, which he hoped would be brought out.

E. A. Elliott referred to sign lighting as one of these, and pointed out that signs were better revenue getters than irons. Moreover, they help to light the streets and will assist in attracting manufacturing projects to the town. In Mount Vernon 40 or 50 photographs were obtained from sign manufacturers and displayed in the show window. This resulted in placing 11 signs in five weeks.

T. F. Kelley agreed that signs are good revenue getters, but the co-operation of the sign manufacturers is necessary to make a successful campaign

W. C. Anderson mentioned the soldering iron as another element in developing load. In operation it is cheaper than a gas-heated iron, but has the disadvantage of high initial cost.

J. C. Martin said that the whole industry is a good example of building up load.

Amendments to Constitution.

The amendments to the constitution were then brought up for consideration and adopted. A new section, No. 8, was added to Article III, providing a new class of membership for the engineers who will be known as engineering members and may hold appointive offices, but do not have the right to vote. The dues are $5.00. Such membership is not open to employees of companies eligible to active or associate membership.

Section 1 of Article IV was amended to fix the dues of active members as follows, according to population by the last census: towns up to 5,000, $5.00; 5,000 to 10,000, $10; add $5.00 for each 5,000 of population up to $50 for 50,000; above 50,000 add 25 cents for each 1,000 of population; provided that the dues shall not exceed $50 for any company whose gross income is less than $100,000.

The Executive Committee then presented a resolution favoring the publication of a monthly bulletin in place of the souvenir program. This bulletin is to be managed by the secretary but the general policies governing its publication will be decided by the Executive Committee. This was discussed by Messrs. Gaskill, Caldwell and Tait. A subscription will be charged, but the subscription for one copy to any member will be taken out of dues; extra copies must be paid for separately. It is expected that other utilities will support such a publication, since it will contain matters of interest to all of them regarding legislation and the activities of the various commissions created by the legislature. This resolution was adopted.

On account of the additional work which will thus be thrown upon the secretary, F. M. Tait presented a motion increasing the secretary's salary by $300. This was carried.

The report of the Nominating Committee was then presented by F. M. Tait, and as there was no opposition, the nominees were elected, as follows:

President, J. C. Martin, Wilmington; vice-president, C. V. Hard, Wooster; secretary-treasurer, D. L. Gaskill, Greenville.

Executive Committee: W. C. Anderson, E. W. Lathrop, W. Parsons, W. R. W. Griffin, Robert Lindsay.

Advisory Committee: F. M. Tait, H. L. Montgomery, W. J. Rose.

Finance Committee: W. F. Hubbell, J. T. Kermode, F. O. Plymale.

Publicity Committee: W. M. Adams, J. J. Cramer, R. A. Woods, N. Owitz.

Committee on Electrical Transmission: M. H. Wagner, S. M. Rust, P. Barnhard.

Membership Committee: W. J. Hanley, E. VanWinkle, P. J. Williams, C. J. Ratterman, N. C. Cotabish, George S. Vail, W. F. Benedict.

Committee on Meters: A. H. Bryant, C. B. Steele, John Himes.

Committee on Insurance: D. L. Gaskill, J. C. Martin, Elam Fisher.

Rate Research Committee: M. E. Turner, O. H. Hutchings, J. D. Lyon.

Committee on New Business Co-operation: Thomas F. Kelley, R. H. Wright, Parker Kemble, W. A. Wolls, William Marshall, R. N. Hodgson.

Secretary Gaskill then presented applications for membership. Two associate members were elected and L. A. Pettit was elected the first engineering member. At a later session, F. C. Caldwell was also elected as an engineering member.

Upon motion of W. Parsons the president was instructed to appoint a

committee of associate members to consider an amendment to the constitution changing the dues of associate members, and confer with the Executive Committee as to the action to be taken. The president appointed G. S. Vail, L. J. Milner, E. L. Van Winkle and W. H. Hopkins.

The Human Equation.

S. G. McMeen, president of the Columbus Railway and Light Company, then made an address on the subject, "The Human Equation." This was an entertaining and instructive dissertation upon those human qualities which probably are governed by as definite laws as those which control physical action, but which man has not been able to formulate in precise terms. The effect of these qualities in the development and management of public utilities was brought out. After 30 years of experience and observation, Mr. McMeen claimed that, on the average, public service corporations try to do right more than the average individual, and that is a high standard of comparison. Enthusiasm and special knowledge are the two main elements in successful work.

Utilities cannot today fix their own prices nor even have the final decision on costs. The adaptation to their condition is very troublesome, but the new scheme is fundamentally right. In order to present our own position properly to others, we must know all about ourselves. We must believe in ourselves and have the facts to back up our contentions. Expedients are always wrong. It is apparent that the thought is now running through all the public service commissions that both sides must be treated fairly or both will suffer. This is a hopeful sign. Commission control is far superior to dealing with legislative bodies such as city councils or state legislatures. The latter are made up largely of men holding office for short terms, who have had no experience in utility matters, and lack both the special knowledge and the enthusiasm necessary to properly handle the questions involved. Mr. McMeen closed by advising officials to consult their subordinates as to problems which come out, as a fresh brain, even though less able, will often see a solution which the experienced man has overlooked.

A unanimous standing vote of thanks to Mr. McMeen was then passed, on motion of M. E. Turner.

Report of Meter Committee.

The report of the Meter Committee was then presented by the chairman, A. H. Bryant. This committee divided the state into three districts and intended holding meetings during the winter in each district. Meetings were actually held at Lima and Canton, but on account of the spring floods the conference at Columbus was postponed until fall. The meetings at Lima and Canton were well attended by representatives of the companies in the adjacent territories and valuable discussions were had. The Committee recommends that these conferences be continued and that a general conference at some central place be held also; that occasional reports be sent to the heads of all meter departments calling attention to information of general interest; that the Committee issue to the meter men of member companies circular letters, through which questions, answers and summarized discussions may be exchanged. As an appendix to the report the Committee presents three papers which were read at the conferences: "The Importance of Maintaining Meters Within Commercial Accuracy," by F. C. Jeannot; "How to Schedule Meter Tests," by John Himes; "A Brief Discussion on the Methods of Meter Testing," by C. B. Stelle.

The discussion was opened by Weare Parsons, who spoke in justification of periodical tests. He gave some figures showing the cost of testing meters in Springfield. In one year 2,623 meters were tested at a cost of $758.31, or 29 cents per test. These meters represented 71 per cent of the total in use. Of the meters tested, 67 per cent were found correct within two per cent; 16 per cent were fast, and 17 per cent were slow. The average registration of the latter was 93 per cent of the actual energy, representing loss to the company of $3,000. The saving to customers on fast meters was about $2,500, so that the total gain in revenue does not entirely pay for the cost of testing meters. Periodical tests, however, are heartily desirable for other reasons, as they often disclose conditions that would not be found by the meter reader. Examples of this were given. Such tests also increase the public confidence in the utility company, and where public service companies have provided for rebates when meters are found to be fast this allowance will be saved by keeping the meters within the limits of tolerance.

W. S. Culver compared the watt-hour meter with other types of meters and discussed the requirements of a good meter. He gave as the order of accuracy of different kinds of meters the following: electric, gas, steam and water.

John Himes told of the experience in Dayton in reclaiming the water-soaked meters, of which there were about 1,400 direct-current and 4,000 alternating-current, out of 7,500 in use. This represented about three-fourths of the total installation of meters. On account of the mud which had penetrated the meters it was found necessary to thoroughly wash them before drying. They were then tested and adjusted for accuracy. On the direct-current meters repairs were required as follows: armatures, 11 per cent; brushes, 8 per cent; potential resistances, 13.5 per cent; shunt-field circuits, 9.5 per cent; while all meters required new pivots. The alternating-current meters proved to be very slow in drying out and many of the potential coils broke down after they were apparently dry. It was consequently found necessary to boil out the moisture under hot oil. 9.5 per cent of these required repairs, principally to the potential coils.

J. T. Kermode told of the conditions in the small town of Bedford, where the meters had not been regularly tested. When testing was finally done it was found that the meters averaged only 70-per-cent registration. The type of meter in use here was a commutator meter on alternating current.

D. L. Gaskill referred to the excellent work which had been done by the Committee and held it up as a model of what the standing committees should do.

Electrical Transmission.

The final session was called to order at 10 o'clock on Friday morning by President Martin, and the report of the Electrical Transmission Committee was presented by the chairman, M. H. Wagner.

This report discussed the troubles due to lightning and pointed out that while it was impossible to prevent damages from direct strokes, the troubles caused indirectly can be very largely alleviated by the use of suitable lightning arresters. The defects of the multigap arrester were pointed out and reference made to the new compression type which had been brought out for use on voltages up to 10,000. These arresters are mounted on the transformer pole, one in each phase. The use of other common types of arresters was described. The importance of good ground connections in connection with lightning arresters was emphasized.

The subject of overhead crossings was then taken up and reference made to the standard specifications drawn up by the American Telephone & Telegraph Company, the National Electric Light Association and others. A design of overhead-crossing construction used by the Dayton Power & Light Company was illustrated by a drawing. The legal rights of electric companies in Ohio were explained by extracts from the statutes covering this subject. Electric light and power companies have been given the same rights

originally conferred upon the telegraph and telephone companies of erecting the wires along public highways outside of municipalities without permission from the local authorities.

D. L. Gaskill opened the discussion by referring to the statutory provisions just mentioned. These are very liberal and while it is not necessary to get the consent of the county commissioners for erecting lines outside of municipalities he thought it desirable to do so when possible.

Weare Parsons referred to the compression type of arresters and stated that over 300 of them were in use in Springfield, one being used for each transformer. He had never known a cap to blow off, as mentioned in the report. He did not agree with the objections to the multigap arrester given by the committee, as the only one of these which had been destroyed resulted in the prevention of other damage.

W. S. Culver also disagreed with some of the statements made regarding arresters in the report, but thought the art of protecting against lightning had now reached a stage where there will be much less rapid change in the future than there has been in the past. No arrester can prevent trouble from direct strokes, but very good protection can be had against indirect results. The overhead ground wire gives some protection and when used should be grounded at every pole. Additional ground wires justify their expense only in exceptional cases. The multigap arrester has been superseded by the electrolytic type for high voltages. The compression type of arrester is a modification of the multigap arrester adopted for transformer protection and has given good results both in actual use and in laboratory tests. He advised the use in connection with a horn-gap arrester of an auxiliary horn with a resistance in series. He also emphasized the necessity of a good ground and stated that an iron pipe is the best and cheapest for the purpose. Around a power station it is advisable to drive a number of such pipes and connect them with copper wire.

F. C. Caldwell spoke of the necessity of accumulating all the experience available on this subject and suggested that the committee should send a blank form to each company asking for results obtained with arresters during the previous year. He spoke of trouble on the lines of the Columbus Light & Traction Company, which had been supposed to be due to surges occasioned by switching. When the matter was tested out by the use of an oscillograph, however, no trouble of this kind could be located. He suggested that ground pipes should be filled with water and covered with a cap and occasionally refilled in order to keep the ground in the vicinity moist. He inquired whether the use of salt around a ground pipe would, through rusting the pipe, introduce a poor contact with the ground.

Mr. Wagner replied that it had been shown that rust was not detrimental to the discharge of lightning and stated that the committee proposed to obtain information from the principal companies during the coming year as suggested by Professor Caldwell.

On motion of Secretary Gaskill it was decided that a committee of three on illumination should be appointed by the president and also a committee of five on electric hauling. The Committee on Insurance was instructed to investigate inter-insurance as provided by the Utilities Indemnity Exchange and report to the Association.

The president appointed upon the Committee on Illumination S. E. Doane, P. H. Kimball and B. C. Edgar.

On the Committee on Electric Hauling he appointed M. E. Turner, W. J. Marshall, W. A. Wolls, Thomas F. Kelley and S. F. Messer.

Franchises.

An address was then presented by James V. Oxtoby, counsel for the Edison Illuminating Company, Detroit, on "Franchises." In this address Mr. Oxtoby especially emphasized the fact that utility companies are learning that a term franchise is not very desirable and not as satisfactory as used to be supposed, when companies depended upon Providence or good fortune to take care of them upon the expiration of the franchise. The subject was divided into three sections: (1) Term franchises and their effects upon property rights and rates were first discussed. Recent decisions of the United States Supreme Court have shown that a term franchise means just what it says and that the rights of the utility company to occupy public highways utterly ceases upon the expiration of the franchises, and that the limitations of the franchises upon the utility company are binding. This has been fully established by the decisions in the Detroit Railways case and the Denver Waterworks case. In the latter case there was a provision in the franchises that the city might buy the property upon expiration of the term or might extend the franchise. The court decided that it was not bound to do either. The original idea of a limited-term franchise was to permit the readjustment of rates, etc., when the time came for renewal. This is all right when the two parties to the negotiations meet upon equal terms. However, where there is a municipal plant which does not want any competition there is no chance whatever for renewal. The expiration of a franchise can best be met by computing rates so as to fully amortise the investment at the end of the term and cover the cost of removal. This is well illustrated in the case of the Cataract Power & Conduit Company, in Buffalo, N. Y., where this view of depreciation was approved by the Public Service Commission, which distinctly stated in its opinion that depreciation must be treated differently than where the franchise is of indefinite duration. However, the Commission would only recognize this method where it had been definitely put in operation by the company. It is thus apparent that the company with a limited franchise should not conduct its affairs as if the franchise were a perpetual one. If the public realized that term franchises inherently required higher rates they would not be so much urged. In Michigan the state constitution contains a provision inserted in 1909 that all franchises shall be limited to a period of 30 years. This is a step in the wrong direction.

(2) The effect upon franchises of the newer constitutional provisions regarding home rule were then considered, as well as the effect of these upon the right of the state itself to regulate a utility. In Michigan, franchises must now be secured from municipalities and cannot be granted by the state, as was formerly the case. Cities adopt their own charters and amend them at pleasure. A popular referendum, however, is required upon all franchises. In Ohio, also, under the new constitution, cities are adopting new charters framed by themselves, as recently exemplified in Cleveland. The question was raised by Mr. Oxtoby as to whether the state, as represented by its Public Service Commission, would have any jurisdiction over local utility companies if the municipal charter should cover the subject of franchises and put control in a local body. Is it not possible in such cases to make control entirely independent of the state commission? The Cleveland charter requires that no exclusive franchises shall be given and that the city shall in all cases have the right to regulate and to terminate a franchise by purchase of the utility. The method of purchase may be fixed by ordinance. There is no provision against either term franchises or indeterminate franchises. If term franchises were prohibited this arrangement would be about ideal. Indiana has followed Wisconsin in providing for indeterminate permits, but Illinois in its new law has carefully avoided this provision. The best solution of the question proposed up to date is the indeterminate permit with protection against competition. The subject of

franchises is an economic one and not a political one, and from the economic point of view this is undoubtedly the best solution.

(3) Mr. Oxtoby next referred to the question of whether rates which are specified in a franchise are subject to regulation by the state; that is, can the state give a commission power where a municipality has already made an agreement with the utility company? In Michigan this cannot be done and it has been claimed that a provision in the constitution of 1909 makes all prior agreements void. In Wisconsin the legislature has repealed local franchises which conflict with control by the state commission. This question arose in Hamilton, O., in the case of the gas company, which had been given an exclusive franchise. Later the State Legislature gave the city the right to construct a municipal plant and this right was sustained by the United States Supreme Court. In closing, Mr. Oxtoby pointed out that a franchise has no inherent value of its own. It simply guarantees the integrity of the property which is placed upon the public highways, but does not increase the value of this property.

A rising vote of thanks was tendered to Mr. Oxtoby upon the conclusion of his address.

President Martin explained that the Association's committee had opposed the bill recently pending in the Ohio Legislature providing for indeterminate permits, because it placed entire power in the hands of local commissions to be appointed by the mayors of municipalities. Opposition was due to the latter feature and not to the fact that the indeterminate permit was objected to.

The report of the Financial Committee was then presented by J. T. Kermode, who stated that the treasurer's report had been audited and found correct. This report was accepted and the convention then adjourned.

Exhibits.

The exhibit hall contained a number of interesting exhibits.

Canton Rubber Company, Canton, O., represented by Conrad S. Weeks and George W. Weeks, had on display electricians' tested rubber gloves for 4,000 and 10,000 volts. These are also made for voltages up to 30,000.

Central Station Steam Company, Detroit, Mich., represented by W. G. Bryant, exhibited the Detroit rotary condensation meter and the diaphragm type of expansion joint.

Duncan Electric Manufacturing Company, Lafayette, Ind., represented by William H. Sinks, exhibited direct and alternating-current watt-hour meters, rotating standards, etc.

Fort Wayne Correspondence School, Fort Wayne, Ind., exhibited various makes of instruments. R. H. Lopshire was in charge.

Hoover Suction Sweeper Company, New Berlin, O., exhibited vacuum cleaners.

Hubbard & Company, Pittsburgh, Pa., displayed line material.

Packard Electric Company, Warren, O., exhibited the A-W Mazda regulator and series lighting system, sign transformers, and lightning-arrester equipment. There was a working demonstration of the latter, consisting of high-tension apparatus for giving a spark discharge at 60,000 volts, a 6,600-volt power transformer for continuing the arc, horn-gap arrester and Schweitzer & Conrad high-tension fuses. W. C. Woodland and W. F. Parker were in attendance.

Philadelphia Electrical & Manufacturing Company, Philadelphia, Pa., represented by W. O. Dale, exhibited street-lighting and industrial fixtures and accessories.

Standard Underground Cable Company, Pittsburgh, Pa., represented by R. B. Wilcox, exhibited junction boxes, cable terminals, sections of cable, etc.

Vulcan Electric Heating Company, Buffalo, N. Y., represented by E. F. P. Schuerer, exhibited sad-irons, disk stoves and other heating devices.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., exhibited ozonizer, fans, lamps, meters, micarta insulation, irons, tire vulcanizer and other heating appliances. The various steps in the manufacture of Mazda lamps were shown. This company also provided a converting station outside the exhibit hall for supplying alternating current to exhibitors. A motor driven from the direct-current supply was belted to a 30-kilowatt 60-cycle alternator. H. W. Beaumont was in charge.

Other companies occupying booths were: Crocker-Wheeler Company, Ampere, N. J.; Enterprise Electric Company, Warren, O., represented by Charles B. McCurdy; General Vehicle Company, Long Island City, N. Y., represented by G. D. Smith; Utilities Indemnity Exchange, St. Louis, Mo., represented by Lynton T. Block and B. H. Batte; Valentine-Clark Company, Toledo, O.

The Cuban Government has authorized the establishment of electric light plants in Jovellanos, Isabela de Sagua, Calimete, Manguito and Amarillas. Petitions have been presented for the establishing of electric light plants in the following Cuban towns: Madruga, San Nicolas, Catalina de Guines, Jaruco, Carabello, Bainoa, San Antonio, Rio Blanco del Norte, Moron and Los Arabos.

THE SOCIETY FOR ELECTRICAL DEVELOPMENT.

Some Observations on the Underlying Principles.

By J. Robert Crouse.

There are always some underlying, basic principles governing all change and progress—whether in the field of research, engineering, manufacturing or merchandizing. These principles are of the same essential quality as the axioms in mathematics or refined statements of particular relations, such as $I = E/R$ in our electrical business. Such principles do not depend for their truth or power upon minority or majority assent, and when once fairly stated, are assured of final acceptance since essential progress must be made in harmony with them.

Progress in our electrical business during thirty years (notwithstanding that less than 30 per cent of the population is electrically served) has been one of the wonders of the world; its contribution to the comfort, happiness and efficiency of our modern life is so great that we wonder how a preceding generation did without it. We may justly feel proud of such a magnificent business which in every department of its development is so worthy of our best thought and effort.

The efforts of those engaged in the fields of research, engineering and manufacturing have shown the most marked results, since, while enjoying the stimulus of the friendly rivalry of other men and organizations, they have been free from the sort of competition which makes the accomplishment of useful results expensive and difficult. It is a matter of common observation that rapid progress has been made in discovery and research, in efficient engineering adaptation of discovery to practical manufacture, and improved products tending to better conditions of generation, construction and distributing systems.

However, in the field of selling and distribution we are challenged by the cold fact that no essential progress—meaning by this a decreasing ratio of sales expense to sales—has been generally accomplished. Not only this, but there is a prevailing opinion among the manufacturers, jobbers, dealers and contractors that the ratio of sales expense to sales tends to increase. The annual reports of some of the largest electrical manufacturers makes specific mention of this tendency as a fact in their operation. Among central stations this is doubtless less true, since by common consent they are properly monopolistic for the best results and competitive only with other methods of furnishing service for light, heat, power and other useful purposes.

Our electrical business, technical in its

very nature, has doubtless for that reason placed less emphasis in the past on aggressive selling and distributing effort—witness the fact that the first commercial papers in the National Electric Light Association appeared only so recently as 1905, and national advertising by individual companies began about 1907-1908.

It is estimated that the gross sales, ratio of sales expense and sales expense for 1912, in the electrical business, were approximately as indicated in the following table:

Branch of Business:	Gross Sales: 1912.	Per Cent Ratio Sales Expense to Sales:	Sales Expense: 1912.
Central stations.....	$400,000,000	5 per cent	$20,000,000
Manufacturers and jobbers.....	300,000,000	15 per cent	45,000,000
Dealers and contractors	100,000,000	15 per cent	15,000,000
Total	$800,000,000		$80,000,000

This $80,000,000 of sales effort (which is equal to one-fifth of the gross sales of all the central stations) is incurred by approximately 5,000 central stations, 500 manufacturers, 200 jobbers, 5,000 dealers and contractors—a total of 10,700 organizations. It is of special importance to note that $60,000,000 of this $80,000,000 sales effort is incurred by the manufacturers, jobbers, dealers and contractors who operate under complete competitive conditions, at a sales expense ratio of at least 15 per cent—and tending to increase.

While this table and the above comment are broad generalizations, the reader is asked to check the principle and its application in his own particular case.

These facts in themselves are a challenge to commercial men, which cannot be avoided. They justify the most careful search for causes and investigation of plans for improvement.

Whatever minor causes may be contributory to this failure in more efficient merchandizing, the major one, which experience and the facts disclose, is competition among these thousands of companies, resulting in expensive duplication of all kinds of sales efforts and failure to co-operate in a definite organized plan in those kinds of endeavor which supplement legitimate competition.

This competition is to a very great extent to secure the business held by others or of natural growth—which we may characterize as the existing market. A very large part of the selling effort is exerted on this existing market and dissipated in commercial friction and lost motion, with resulting decrease in its creative effect.

The fact is frequently overlooked that the current-consuming devices for light, heat, power and other useful purposes are the only aspects of our business in which the public are or can be interested, while they constitute but a small part of the resulting business from the boilers to the devices the public uses. We are therefore all, without conscious organization, joint sellers of the final service.

The age of business (in which someone has said we live to do business, instead of doing business to live, in the best sense) is in the order of social development the successor of the period when war—the extreme of competition—was the principal occupation. Business has inherited from this prototype many habits of enmity, antagonism and waste, which only the persistent cultivation of good fellowship, harmony and economy will gradually supplant. The most successful organizations which I have observed have given the greatest attention to the cultivation of harmony among their men, and the spirit of progressive, constructive effort. This same result must measurably follow similar conscious effort by an entire industry.

The Society for Electrical Development proposes a broad, common organization of our entire industry: central stations, manufacturers, jobbers, dealers and contractors (controlled by a balanced representation from each), through which a part of this $80,000,000 of unorganized and competitive sales effort can be more effectively exerted through organized and co-operative effort in promoting and popularizing electrical service. These plans to teach the public to "Do it electrically"—many more than can at once be undertaken—have been worked out and endorsed as entirely practical by many prominent men in our business.

The Society proposes at the start that a minimum of $200,000 or but one-fourth of one per cent of this $80,000,000 of competitive sales expense, be co-operatively expended. The basis of subscription is for manufacturers, and central stations, one-fifteenth of one per cent of gross sales, and one-twentieth of one per cent for jobbers, dealers and contractors, amounting, for illustration, in the case of the former, to $66.66 per $100,000 of gross business, and in the latter case to $50 per $100,000 of gross business—the subscription being on an annual basis. This means in the case of a company having a 15 per cent sales expense account, but one-three-hundredth of its sales appropriations. There are few organizations which cannot locate competitive expenses of doubtful value equal to the Society's subscription. While individual subscriptions are comparatively small and in no sense burdensome, yet general co-operation in the movement will make a fund of $500,000 per annum available for progressive and aggressive market cultivation along these new lines.

This Society creates the organization and the fund through which some of our dollars can co-operate with the good will of us all in broad effective activity for the expansion of the market, while we continue with the most of our dollars to compete for our fair share.

This plan means real progress in the direction of more efficient distribution of electrical service through joint cultivation of our common market—the great pre-occupied, incredulous, money-spending public—a result which our present systems neither accomplish nor promise ever to achieve on the old lines.

The plan presents a new kind of consolidation for sales efficiency through a better balance of competitive and co-operative effort to which the popular thought will not now nor in future take exception.

The plan means that electrical men—identified with this most wonderful of all businesses—will demonstrate for themselves and by example for others—the true principles which underly progress in more efficient sales distribution, through the creative cultivation of the market. The plan lends dignity to the art of selling—synonimous in the best sense with service—and marks a further point in the age now happinly passing, when the selling spirit was symbolized in the economist's expression *"Caveat Emptor"*—"Let the buyer beware."

Corrosive Action on Lead Cables.

H. Webber, borough electrical engineer of Keighley, England, has had serious trouble on his old network of distribution mains, and on the feeder cables supplying this network. The trouble has in every case been caused by a corrosive action which seems to have taken place over a number of years between the lead covering of the cable and the little wooden bridges which support them at intervals of two feet. The wooden supports seemed to have been put in while wet.

Mr. Webber says it is an accepted fact that wood should not be placed in contact with lead-covered cables owing to the possibility of a vegetable acid being contained in the wood, which will gradually eat the lead away and leave the copper cable bare. This eating away process has evidently taken place and at some of the Keighley supports there were no signs of lead left whatever, while the condition of the lead varies according to the particular quality of the wooden support. With so many thousands of supports the matter is serious and Mr. Webber proposes that wherever a fault occurs the old cable be removed for a considerable distance on each side of the fault and renewed with new paper-insulated cable instead of the jute insulation originally installed.

Wireless telegraph service now connects the six state capitals of Australia and will shortly girdle the entire continent.

Russian Delegates Visit Waterside Station.

The delegates from the Russian Society for the Promotion of Technical Education visited the Waterside Station of The New York Edison Company on Saturday, July 12.

There were about 70 in the party—men and women—and they were taken through the big plant in groups of about ten, each in charge of an Edison employee, while an interpreter explained all the details of the equipment, from unloading the coal barges in the river to the overhauling of the 30,000-horsepower turbines in the generating room.

The visitors were in the plant at a time when preparations were under way to meet a sudden increase in the load, for the weather man on the roof had announced an approaching storm. They heard the whistle signal for additional generators to get under way, they watched the automatic stokers feed the additional boilers, and they were particularly interested in the system operators' record showing the increase in the load.

The entire morning was spent in the plant, and after the inspection the party was taken to the Pennsylvania station where they entrained for the Jersey sea-coast resorts.

William Gould and Alexander Brown, of the New York Edison Company, were in charge of the party, Mr. Brown acting as interpreter. J. P. Sparrow, chief engineer, and W. H. Lawrence, superintendent of Waterside, escorted the party through the stations, which supply current for six million incandescent lamps, 40,000 arc lamps and 400,000 horsepower in motors.

The women in the party included M. N. Bodaleva, E. A. Veidenbaum, physician; V. N. Vigilansky, school teacher; A. A. Cartier, school teacher; N. S. Golovachev, dentist; E. I. Grigoriev, dentist; E. P. Dekonsky, teacher of musical conservatory; A. D. Duvakin, high-school principal; N. V. Ermolov, school teacher; A. A. Kisel, physician; V. N. Kifa, teacher of housekeeping; S. K. Kontrolsky, teacher of Imperial Conservatory of Music; N. K. Krotkov, school teacher; M. N. Orlov, school teacher; M. I. Radomsky, school inspectress; L. I. Rozanov, high-school teacher; M. N. Zabel, high-school teacher; E. N. Shigaev, student; V. A. Shirer, high-school teacher, and L. S. Yanovsky, school teacher.

Among the men in the party are N. S. Aralov, director Moscow City Credit Society; A. H. Asmaev, teacher commercial school; S. V. Astapovich, public-school principal; I. A. Bugaev, inspector of weights and measures; A. N. Buchalo, barrister; M. N. Vavilov, civil engineer; L. S. Vartazarianz, instructor in arts; V. I. Gartier, high-school teacher; S. I. Glusky, justice of peace; A. B. Glosov, high-school teacher; C. G. Grigor, high-school teacher; T. B. Grinev, teacher of governmental military college; A. N. Evdokilov, teacher of governmental military college; A. D. Zavarfzin, student of Moscow University; I. I. Zavialov, principal elementary school; I. D. Kalashnikoff, teacher of People's Institute; A. G. Kamensky, high-school teacher; V. A. Kissel, student of Mossow University; G. K. Klossorsky, student; K. K. Klossorsky, civil engineer; P. A. Kontrolsky, student; G. S. Kotikov, teacher of agricultural school; V. N. Krivzov, excise commissioner; V. P. Lebedev, high-school teacher; V. N. Lugovsky, agriculturist; G. A. Nazarbekov, student; E. S. Necshusko-Buinitsky, student; M. S. Novikov, land owner; K. E. Ostrovskich, physician; V. F. Popov, high-school teacher; P. I. Repiev, physician in government service; S. V. Semenov, high-school teacher; P. P. Sidorov, manager manufacturing concern; V. H. Smitten, student; S. L. Tregnbov, physician; M. A. Tulinov, agriculturist; H. M. Turovsky, agent of steamship company; P. I. Chitrov, high-school teacher; H. K. Chetverikov, civil engineer; D. M. Shorygin, agriculturist, and A. F. Yanovsky, magistrate of jurisprudence.

Russian Visitors at Waterside Station.

German Electrical Manufacture at High Tide.

Commenting on the German manufacturing industries, an American consul at Kehl, Germany, recently reported that the manufacture of electrical goods has continued to show a favorable growth. It is, however, the opinion of some who are in the business that Germany has about reached the high tide in this branch of industry, and that a further enlargement of the industry is scarcely to be expected.

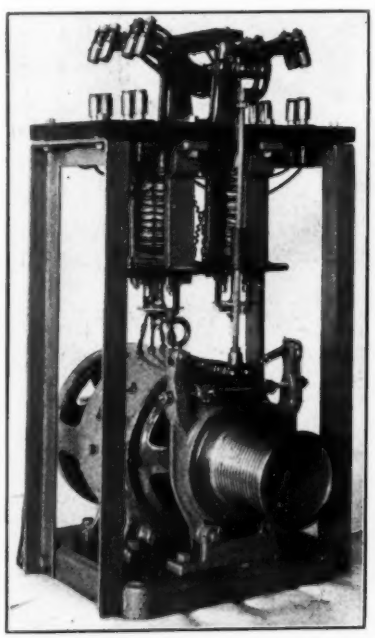
Electrification in Berlin.

The final specifications for changing from steam to electric the traction on the urban and interurban lines operated in Berlin and its suburbs by the Prussian Government have been approved by both houses of the Prussian Parliament and work on the project has commenced.

New Electrical and Mechanical Appliances

Direct-Drive Dumb-Waiter Elevator Mechanism.

The large amount of friction incident to the worm-gear drive of the elevator mechanism constitutes a considerable portion of the total power loss incident to the electric-motor drive of this class of machinery. The illustration shows the installation of a Diehl one-half-horsepower, 300-volt, steel-frame motor in connection with the driving mechanism of a small dumb waiter, gearing of any kind being eliminated. In this illustration the drum carrying the cable is mounted directly upon an extension of the armature shaft which runs at a speed of 160 revolutions per minute, this slow speed being necessary to keep the car within power limits. The drum itself is about four inches in diameter. The entire installation is amazingly compact and occupies but small space as the switches and starting resistances are mounted on a frame which is made part of the motor base by angle-iron framework bolted to the bed plates.



Gearless Motor Driving Dumb Waiter.

The motor shown in the illustration was manufactured by the Diehl Manufacturing Company, of Elizabeth, N. J.

Tregoning Separable Attachment Plugs.

The increasing use of all kinds of electrical appliances has created a considerable demand for improved attachment plugs, by means of which these appliances may be connected to lighting or other circuits suitable for their use. In the way of new types of attachment plugs the Tregoning Electric Manufacturing Company, 422 West Prospect Avenue, Cleveland, O., has for some time been manufacturing a line known as the Anti-Knot attachment plug, which is a solid plug with the distinct feature of a cord grip; this latter holds the cord securely and relieves the binding screws from all strain.

A similar feature has been incorporated in a new plug which the company has just put on the market and which is designated as No. 219 separable-at-any-angle plug. In the accompanying illustration the feature above referred to is shown at the top of the cap. The cord-gripping effect is obtained by turning or screwing the usual new Code reinforced cord, either No. 16 or 18, into the threaded composition cap; this saves tying a knot with its attendant loss of time and using up of an inch or so of cord, and it also eliminates wear on the cord, producing frayed edges with their unsightly aspect and weakened condition of the insulation. The grip accurately secures any reinforced cord with a diameter from 0.26 to 0.36 inch. This cord grip especially appeals to manufacturers of electrical appliances and can be applied in modified form to other electrical fittings.

Separable Attachment Plug with Cord Grip.

Another feature possessed by this new plug is a unique means of separating the cap from the body of the plug. The cap, to which the cord is secured, is readily separated from the body of the plug itself by any pull exerted upon the cord in any direction. This is a valuable means of protecting expensive appliances of various kinds from injury due to possible falling from a table or other support when the cord is pulled by coming in contact with anything that may exert a strain upon it. Thus the two parts of the plug easily separate and prevent damage both to the appliance and also to the lighting fixture to which the plug may be attached.

These new separable plugs are made with various finishes. The one shown in the accompanying view, which is two-thirds of the actual size, has a composition cap and black porcelain base. Similar types are manufactured with both parts out of black porcelain, or out of white porcelain, or with a composition cap and a white porcelain base.

New "Red Devil" Glass Cutter.

The Smith & Hemenway Company, 150 Chambers Street, New York City, well known for its "Red Devil" tools, has added to this extensive line a new and improved self-oiling glass cutter with turret head. An illustration of it appears herewith. The oiling device is behind the six wheels. Unlike other glass cutters of this type, the new tool makes use of a very hard tempered pinion, so that the wheels run uniform and true. This can be adjusted to either wheel 1, 2, 3, 4, 5 or 6, thereby getting the full benefit of the service of all wheels.

New Six-Wheel Glass Cutter.

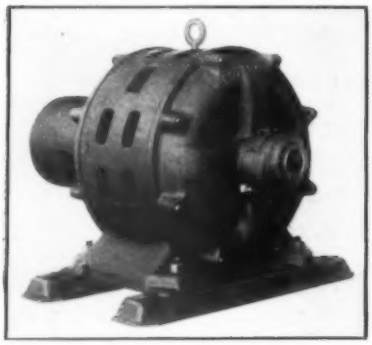
The frame is so designed that it protects the wheels and prevents them from coming in contact with moisture. The handle is shaped to conform to scientific principles, making the tool very effective and yet comfortable to use.

Only the highest grade hand-honed wheels are used. This has made the "Red Devil" wheel famous and has created such a demand for them that about

2,500,000 "Red Devil" glaziers' tools are manufactured and sold annually in all parts of the world. The tool is finely finished and has a solid steel head, coppered and nickeled. Along with its many other advantages is its moderate price.

Westinghouse Induction Motor of New Design.

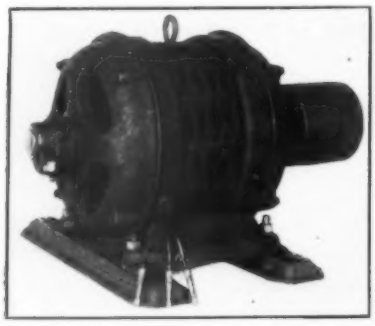
The new Westinghouse type CS squirrel-cage induction motors that have recently been put on the market possess several noteworthy features.



Thirty-Horsepower Induction Motor.

Among these are: The extensive use of pressed steel in their construction; rotors with cast-on short-circuiting rings and moisture and heat-resisting insulation; dustproof bearings; high efficiency of operation.

The use of pressed steel in motor construction represents a marked advance in motor design. It imparts great mechanical strength and is very uniform in structure. Hence a motor of a given weight can be made with



Ten-Horsepower Induction Motor.

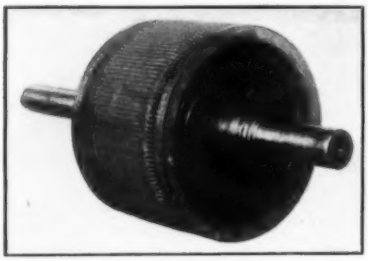
more active material than motors of corresponding capacity in cast-iron frames.

In these motors, rolled steel forms the frames of the sizes above 20 horsepower, the end plates of the smaller sizes (which are of the so-called frameless type) and the feet and the slide rails of all sizes. As a result these motors are very compact, a feature that is of great importance in many

Stator of Three-Horsepower Motor.

applications where space is limited.

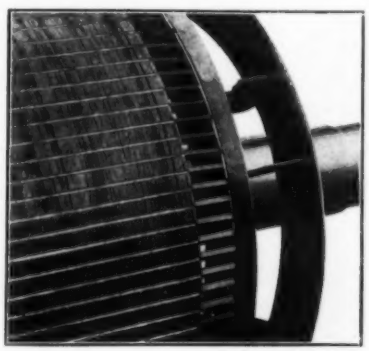
Above five horsepower the form-wound stator coils are laid in open slots. Repairs in case of accident can be readily made. The rotor construction is especially interesting. In all sizes, the rotor bars are insulated with a special cement which is moisture-resisting and will withstand a high degree of heat and mechanical stress. In motors above 15 horsepower the bars are connected electrically and mechanically by casting the short-circuiting



Rotor of Three-Horsepower Motor.

rings around their ends. Hence these rotors, having nothing that can burn out, deteriorate under heat, or work loose under vibration, are practically indestructible.

The bearings, being the only wearing parts, have been designed very liberally. They are protected from dust by a cap on the front end and by felt



Detailed View of Same Rotor.

washers between the metal rings on the pulley end.

The efficiency and power-factor of these motors are said to be exceptionally high, not only at full loads but at fractional loads also. This last feature is of special importance because industrial motors generally run at less than full load.

These motors are being put on the market in all commercial sizes from 1 to 200 horsepower.

New Kyle Sleet and Rainproof Pulley for Arc-Lamp Hangers.

The extra long inclosing case of the Kyle safety pulley, made by the Line

Kyle Pulley.

Material Company, of South Milwaukee, Wis., forms a complete covering on all sides to keep out sleet and rain. As an integral part of this casing, guide ridges are cast, which automatically guide the safety knob as it is raised, finally allowing it to be supported in the position shown by the accompanying illustration. In this position all the weight of the lamp is taken from the rope by the safety knob being supported by the ridges in both sides of the inclosing case. The rope clamp has rounded edges, and offers protection to the rope on both sides from scraping against the pulley. The small clamp can be used with chain or rope.

The pig-tail hook, which is a part of this clamp, allows the lamp to be attached with one hand.

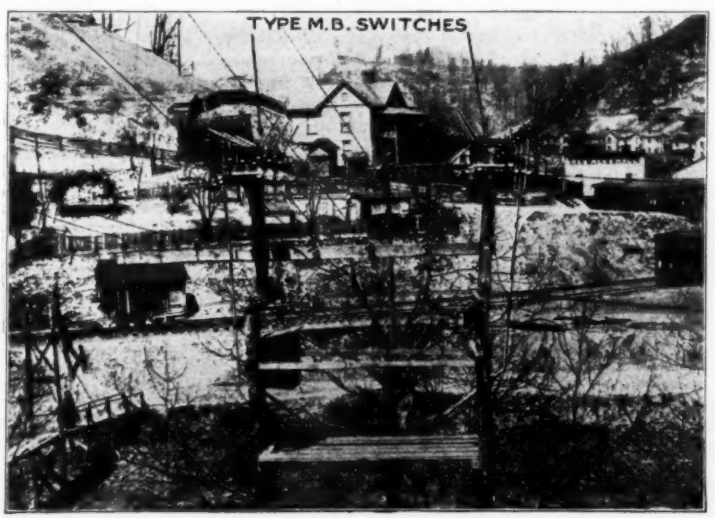
These safety pulleys are made with five standard types of top clamps for suspension from mast arm, outrigger, ceiling and span wire. In the span type clamp, as shown in the illustration, the groove for the wire or cable is opposite to that assumed by the span, so that the pulley locks itself in the position in which it is installed and cannot move along the rope. These pulleys are being used with arc-lamp insulators, and hangers of all types.

Supplying Power to Small Communities.

During the past three years rapid progress has been made in the development of high-tension switching apparatus to control branch lines tapped from main transmission systems. Many small communities heretofore unprovided with electric current are now served at a profit by transmission companies and central-station managers are eagerly looking forward to the possibilities of this field.

The particular installation shown is one of twenty-five on a large transmission system supplying current to many towns, at a primary voltage of 13,200. The switches used, which were built by the Delta-Star Electric Company, Chicago, Ill., are so constructed that later on the pressure can be increased to 22,000 volts, if desired.

In localities subject to smoke, dust and dirt, the ordinary type of insulator of a given rating for normal line voltage will frequently fail when used on switches where excessive surges appear. Such failure may be due to flashover through the accumulation of foreign material on the insulator surface, as has been frequently noted. The switches illustrated have been designed to withstand such abnormal conditions, the leakage surface and arcing distances being far in excess of those usually employed. In this particular installation the insulators have a rated voltage of 27,000 volts and will withstand a test voltage of 80,000, thus giving a very desirable factor of safety. It is well known that high-voltage disturbances in a transmission system usually manifest themselves at the switching equipment which is therefore subjected to abnormal strains. To safeguard this element the use of derated switches is advisable.



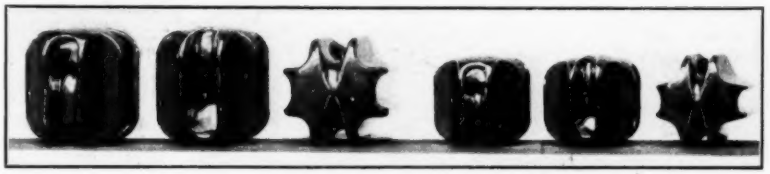
Small Outdoor Substation with Pole-Top High-Tension Switches.

A New Porcelain Strain Insulator.

A new porcelain strain insulator of remarkably high strength, both mechanically and electrically, has been placed on the market by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The manufacturer recommends these insulators for use on 1,500-volt direct-current railway work and on 2,200-volt alternating-current transmission lines, a class of service for which porcelain insulators have been seldom used in the past.

It is claimed that the insulators will stand more strain than any cable used in line construction that will pass through the hole. They are of the interlinking type which makes it impossible for cables to separate even if the insulator should become shattered.

New Strain Insulator in Service.



Several Views of Different Sizes of Strain Insulators.

The glaze is of a dark brown color which does not attract the attention of those mischievously inclined. Sharp corners which would be apt to chip have been avoided and the shape of the grooves is such that the wires lie naturally in them. A large creepage distance is provided by the shape of the insulator, which makes it suitable for high voltages.

The smallest size of these insulators has a flashover voltage on rain test of over 13,000 volts, and the larger size, over 20,000 volts. The tensile strength of the larger size insulator is over 23,000 pounds, and its dimensions are only 5 by 4.5 by 4.5 inches.

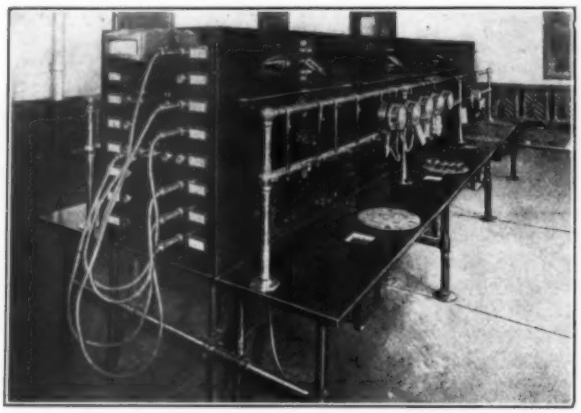
Electric Meter-Testing Table at Albany, N. Y.

Electrical engineers are showing siderable interest in the meter-testing table recently installed in the electrical department of the Municipal Gas Company's plant, Albany, N. Y. The table is constructed in two sections of lengthwise halves. Its dimensions are, length 15 feet, width 5 feet 4 inches, height about 6 feet over all. The rack or upright board is 36 inches high, and the shelf or table 20 inches wide. Both are built of one-inch J-M ebony asbestos wood. The space between the vertical racks at the top is covered over with one-quarter-inch thickness of the same material.

Eight men can work together on this table, four on a side, and each tester can handle four meters. This means a total capacity of 32 meters at one time. Immediately in front of

each tester is a set of binding posts, three load switches and a potential switch providing 110 to 220 volts. The wiring is so arranged that any power-factor may be obtained from 0 to 100 per cent, taking different steps at 0.002 of one per cent. Any load may be obtained from 0 up to 800 amperes.

The eight testers do not interfere with one another and can operate at three different loads; i. e., each man may be using 5, 20 and 40 amperes without interference. Either alternating current or direct current may be obtained at both sides of the table at one time, or the table may be divided up for direct current or alternating current on each side. The different loads are obtained by a plugging arrangement at each end of the table, as shown in the illustration. The approximate load as indicated by the ammeter is also at this end of the table.



Electric Meter-Testing Table.

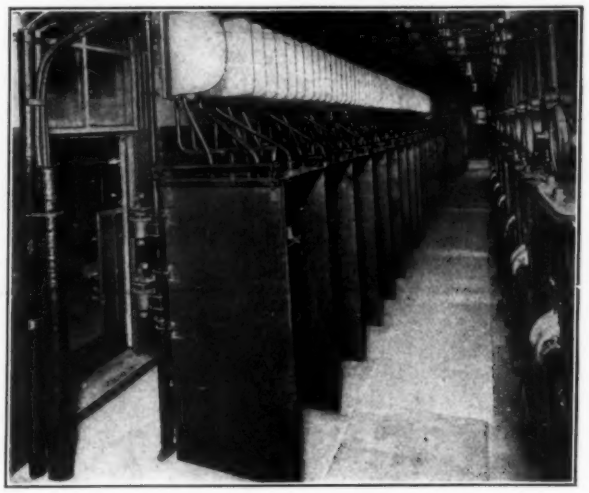
Rotating standards are located under the table. A square opening cut in the table allows the tester to read his standard without changing its position and also while keeping the instrument away from stray fields. The meter rack is made of one-inch brass pipe fitted with separate hangers which will accommodate any type meter.

A very important feature of this table is the method of construction which permits the addition of extra units from time to time without interfering with the original arrangement or wiring.

This table is noteworthy from the fact that it is constructed principally of J-M ebony asbestos wood, a material which is said to be fireproof and to possess greater dielectric strength than slate or marble. It is mounted on 24 one-inch pipe standards, with flanges top and bottom.

The same company is also using J-M ebony asbestos wood for 16 oil-switch compartments shown in the second illustration. These compartments each contain a 2,500-volt oil switch in connection with the 16 General Electric regulators directly opposite them.

Each compartment is 4 feet high, 2 feet wide and 2 feet deep, the sides and back being made of two-inch ebony asbestos wood, and the top of the same material one inch in thickness. The buses over each compartment are mounted on marble, four buses to each compartment. The feeds from the regulators to the oil switches are brought overhead and through the back of the compartments to oil switches which are mounted on the two-inch ebony wood backs of the compartments themselves.



Ebony-Asbestos-Wood Oil-Switch Compartments.

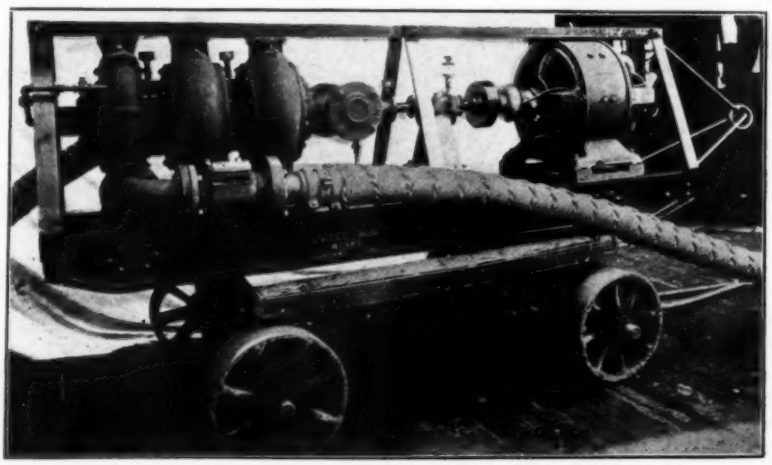
The uses of J-M transite ebony asbestos wood in the electrical field are said to be almost without limit. It combines maximum insulation resistance with high dielectric value, and it possesses an advantage over slate, marble or fiber, in that it can be machined almost as easily as ordinary wood. The manufacturer of this composition is the H. W. Johns-Manville Company, New York, N. Y.

A Motor-Driven Mine Pump for Operating on Inclines.

The accompanying illustration shows an interesting application of a motor-driven pump. It is designed for mine drainage and is to be used on inclines up to 45 degrees from the horizontal.

The pump and motor are held together in a steel framework with an eye at the end to which a cable or rope is attached for lowering the outfit down the incline. The lower part of the framework acts as a skid.

The pump, made by the United Iron Works, San Francisco, Cal., is a four-inch, three-stage machine and operates at heads up to 250 feet. The motor has a capacity of 30 horsepower and is of Westinghouse manufacture. Several pumps of this type are in operation.



Mine Pump for Inclines.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

ALEXANDRIA, MINN.—A "White Way" will be installed here.

CROSBY, MINN.—A Way of Light is assured, to be 5 blocks long.

ALTON, IOWA.—Electroliers will be installed on Main Street soon.

WALNUT, IOWA.—Forty electroliers will be installed in this place.

HIBBING, MINN.—Three blocks will be added to "The White Way."

DYERSVILLE, IOWA.—An electrolier lighting system is assured for this city, it is claimed. C.

BELMOND, IOWA.—$2,215 has been raised to buy electroliers for certain streets.

BELLEVUE, IOWA.—A contract will be let soon for a boulevard lighting system.

FERGUS FALLS, MINN.—John S. Wylie proposes a "White Way" for Fergus Falls.

FONTANELLE, IOWA.—Professor Hill is promoting the cause of electric service.

BEACH, N. D.—J. W. Cox, of Polo, Ill., is planning to build an electric line in Carlyle County.

TRYON, N. C.—The Tryon Electric Light Company will extend its transmission system to Landrum.

ANITA, IOWA.—The Council has been petitioned for more electric lights and is considering the matter.

STORY CITY, IOWA.—$8,000 in bonds will be issued for improving and extending the electric light plant.

LOUISVILLE, KY.—The Louisville Gas & Electric Company has been incorporated with a capital stock of $11,000,000.

FONDA, IOWA.—The proposition of issuing bonds for a municipal electric light plant carried at the recent election.

SPRING VALLEY, MINN.—The new owners of the Spring Valley electric light plant will rebuild as soon as plans can be made. C.

VIRGINIA, MINN.—The Star Electric Company will construct a "White Way" on Central and Mesaba Avenues.

BAYARD, IOWA.—The vote carried to install a municipal electric light plant, the proposition being to bond for $6,000.

LAKE CITY, MINN.—It has been decided to issue bonds for $9,500, part of which is for extension of the electric lighting system.

CANANEA, MEXICO.—C. R. Pelton, of Chicago, will install a power plant, hoist and additional machinery at his mine near here. D.

PORTLAND, ORE.—The Portland Railway, Light & Power Company will build an electric line in certain portions of the residence district.

WADENA, MINN.—The Council has decided to purchase a new engine and dynamo of 200 horsepower capacity for the lighting plant.

KLAMATH FALLS, ORE.—The electric plant at the Klamath Agency was destroyed by fire a few days ago, but it is to be rebuilt at once.

LAWLER, IOWA.—$6,000 in bonds has been voted for the purpose of erecting a municipal electric light plant here. Address the town clerk.

LOS ANGELES, CAL.—The Los Angeles Aqueduct Power Bureau will soon have at its disposal the sum of $750,000, which will be used in the completing of the aqueduct power plant.

MARSHFIELD, WIS.—The Water and Light Commission has been authorized to procure estimates of cost of necessary improvements to the water and light plants here. C.

LYTTON, IOWA.—Lytton Electric Company has been organized with a capital stock of $4,000 for the purpose of erecting an electric lighting plant here.

KENMARE, N. D.—A "White Way" is a certainty. The estimated cost is $2,200, using ornamental posts with five lamps. Thirty posts will be installed.

VILLISCA, IOWA.—The Council has granted a new franchise to the Villisca Public Service Company, and transformers will be installed and also additional street lamps.

DELRAY, FLA.—The Ariston Ice & Electric Company has been granted a franchise to erect poles and string wires around the city for the purpose of furnishing electric light and power.

MUSCATINE, IOWA.—The merchants in the 200 block West Second Street will install boulevard lights, according to a decision reached. Address D. V. Jackson for information.

BLACK MOUNTAIN, N. C.—The Black Mountain Telephone Corporation will expend $5,000 to erect a steam-electric power plant in connection with the Dickey Campbell Lumber Company.

MAXWELL, IOWA.—The Council has granted a franchise to the Maxwell Light & Power Company for the erection, operation and maintenance of an electric light and power plant here.

WILBUR, WASH.—The Washington Water Power Company recently purchased the plant of the Wilbur Electric Company, and proposes making some needed improvements at once. O.

FORT WORTH, TEX.—The Fort Worth Power & Light Company has filed an amendment to its charter increasing its capital stock, for the purpose of making improvements to its plant. D.

GLASGOW, MONT.—This city is contemplating installing additional equipment to the municipal electric light and power plant. For further information address A. T. Melvin, city electrician. O.

NEW HARTFORD, IOWA.—Messrs. Dodd & Simonsen, of Cedar Falls, have been granted a franchise for erecting poles and wires for electric light and power; installation of a plant to begin soon.

NEWPORT BEACH, CAL.—The Pacific Light & Power Company has been granted a 40-year franchise by the city to supply electric light at eight cents, street lights at seven cents and power at two cents.

BUTTE, MONT.—City Engineer Paul Gow has been instructed by the Council to prepare plans for the installation of 320 ornamental arc lights in the city. The estimated cost of this installation is $23,000. O.

POMEROY, IOWA.—Pomeroy has voted to issue $15,000 in bonds to bring electric light and power from Humboldt. Fonda has voted to issue bonds for a similar purpose. Address the City Clerk for further particulars.

LULING, TEX.—The City Council is negotiating for the purchase of the local electric light plant and water works system, which are now owned by private parties. If the transaction is made the plants will be enlarged and improved. D.

NEW HARTFORD, IOWA.—At its last session the Town Council granted Messrs. Dodd and Simonsen a franchise for the purpose of erecting poles and wires on the streets and alleys to furnish electric light and power to the citizens of New Hartford.

GILBERTVILLE, IOWA.—The Gilbertville Lighting Company has been incorporated with a capital stock of $2,000. It is proposed to erect a pole line through the principal streets of Gilbertville. The task of installing the new line will be started soon.

DENISON, TEX.—The Texas Power & Light Company has adopted plans for its proposed hydroelectric plant on the Red River, to cost about $1,000,000. It will supply electric power and lights to a number of towns in this part of the state and in Oklahoma.

HOUSTON, TEX.—The Texas Public Service Company has been incorporated with a capital stock of $500,000 by H. A. Van Eaton and associates. It is proposed to rehabilitate and develop ice and light plants at Gilmer, Mount Pleasant, Vernon and Bay City, Tex.

SAN FRANCISCO, CAL.—The San Joaquin Light & Power Corporation has been granted authority to issue $1,776,000 of bonds, the proceeds to be used by the company in completing its power houses, substations and transmission lines in connection with its new hydroelectric work.

BURBANK, CAL.—City officials

have decided to purchase the system of the Burbank Electric Light & Power Company and hereafter conduct the system as a municipal affair. Just as soon as the plant has been taken over extensive additions will be made to all parts of the system. Bids for this additional material will soon be received by the city clerk. T.

TROPICO, CAL.—The Pacific Light & Power Company, which furnishes this city with electricity, has informed the city officials that its contract for furnishing 1,500 electric tungsten lamps for local street lighting having expired that hereafter the city must furnish its own lamps. City Clerk Street is now receiving bids for this electrical material. T.

SEATTLE, WASH.—The County Commissioners of King County recently granted the Puget Sound Traction, Light & Power Company a 50-year franchise for placing poles and stringing power lines along the county roads of Kirkland and Redmond, and over certain streets adjoining the city limits of Seattle. The Company is authorized to transmit power, heat and light over the lines. O.

CHARLOTTE, IOWA.—The Clinton Gas & Electric Company will install a street lighting system in Charlotte. The current will be supplied from the Clinton Gas & Electric Company, who will put in a line during the coming summer north of Goose Lake, connecting with Charlotte, Creston and Miles, and eventually with other towns of Clinton and Jackson counties. Franchises have been granted in Charlotte and Miles, and will probably be in other towns at elections to be held soon.

MAYVILLE, N. D.—The letting of the water, light and power plant work at Mayville on July 15, was awarded as follows: Power house, Boyd Construction Company, St. Paul, Minn., at $8,108; reinforced concrete stack, Concrete Metal Chimney Company, St. Louis, Mo., at $1,435; boilers, engines, generators and pumps installed complete Northwestern Electric Equipment Company, St. Paul, Minn., at $19,383; sewer and water connections, M. Barr, Mayville, N. D., at $2,074.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

MONMOUTH, ILL.—The Monmouth Telephone Company is planning to build a new line.

JACKSONVILLE, ILL.—The Central Union Telephone Company will erect a telephone line to St. Louis.

FAIRVIEW, OKLA.—The Holland Springs Telephone Company has been incorporated by J. E. Davison and others.

COTTAGE GROVE, ORE.—The City Council will receive bids shortly for an electric fire-alarm system, and the installation of the same.

VANCOUVER, WASH.—O. J. Olson and Ed Murphy, of the Twin Falls Logging Company, propose building a telephone line between this city and Yacolt.

WHITE BLUFFS, WASH.—The White Bluffs & Columbia River Telephone Company will span the Columbia River here and at Hanford with telephone lines. O.

WHEELING, W. VA.—The Consolidated Telephone Company will increase its capital stock from $500,000 to $3,000,000. The company will improve and extend its plant.

CONWAY, WASH.—Skagit Fir Telephone Company has been incorporated with a capital stock of $1,885. Andrew Anderson and Iver Iverson are named among the incorporators.

ELGIN, OREGON.—Eastern Oregon Co-operative Telephone Association voted bonds for $30,000 to complete lines of the company through Union County and Cove La Grand.

EDMONTON, ALTA.—W. J. Harmer, Deputy Minister of Telephones here, recently announced that the government will string 2,400 miles of rural telephone lines this season, at a cost of $2,000,000. O.

ATLANTA, GA.—The Southern Bell Telephone Company will soon commence construction of a telephone line on the Gainesville & Northwestern right-of-way from Gainesville to Cleveland and Robertstown, Ga.

FAIRVIEW, OKLA.—The Holland Springs Telephone Company has been incorporated with a capital stock of $1,000 by W. D. Ross, S. C. Colby, J. E. Davison, S. C. Burlison, James McGraith and Joe Thompson, of Fairview.

MACON, GA.—The Middle Georgia Telephone Company has been granted a charter with an authorized capital stock of $25,000. The incorporators are J. A. Faucett and H. M. Fleetwood, of Macon; J. P. Peacock, of Cochran; M. C. Arnold, of Danville, and H. F. Griffin, Jr., of Jeffersonville.

IMPERIAL, CAL.—After inspecting existing conditions in this valley, Horace B. Day, president of the Home Telephone Company, has decided to install his system here. The estimated cost of the work is about $50,000. Mr. Day states that if original plans are carried out the automatic system will be installed. T.

COLFAX, WASH.—The County Commissioners of Whitman County recently granted franchises to the Inland Independent Telephone Company, a branch of the Independent Telephone Company of Spokane; The La Crosse Telephone Company, of La Crosse, and the Lamont Telephone Company, of Lamont. Each Company named contemplates starting construction work at once. O.

LIMA, O.—The Lima Telephone Company has purchased the plant of the Central Union Telephone Company and will enlarge and improve the system. The cost of the transfer of the equipment, the laying of new lines and conduits and the expansion of the exchange building will cost nearly $90,000. Eight months will be required to effect the reconstruction. Address D. J. Cable, president, for further information.

RIVERSIDE, CAL.—S. B. Kramer has announced that he will soon erect a telephone system in the Pala Verde valley. He has already applied to the County Board of Supervisors, asking that that body advertise for sale a franchise for such a utility. Kramer states that he represents interests that propose to run a trunk line from Glamis to Blythe and other points in the valley. Bids for this franchise will be opened August 20. T.

ELECTRIC RAILWAYS.

(Special Correspondence.)

SCRANTON, PA.—It is said that surveyors of the Scranton-Binghamton electric line claim the road will be in operation in about two years.

NASHVILLE, TENN.—A company with a capital stock of $10,000 has been formed here to build an electric railway from Nashville to Sparta.

LOS ANGELES, CAL.—The City Council has passed an ordinance granting the Los Angeles Railway Company the right to operate its Hanover Street line by electricity. T.

BRIDGEBURG, ONT.—The Imperial Traction Company has received authority to proceed with the construction of a traction line from Smithville, Ont., to Bridgeport, and from Hamilton to Toronto.

GRAND FORKS, N. D.—The Grand Forks Street Railway Company has issued $50,000 worth of bonds for the purpose of carrying on extensive improvements, which include relaying of certain parts of the line.

CINCINNATI, O.—Several surveying parties have been placed at work to lay out the course of the proposed subway canal and the several surface, subway and elevated lines to be included in the rapid-transit loop. G.

SLEEPY EYE, MINN.—The Luce Electric Company is making a survey for the North and South electric line to run from Jackson to Sleepy Eye, and to connect with the road under construction from Minneapolis to Watertown, S. D. Z.

ORANGE, CAL.—Paul Shoup, president of the Pacific Electric Railway Company, has given out the statement that that company intends just as soon as permission can be secured from the State Railway Commission, to erect an electric line to this city from Richfield. T.

OREGON CITY, ORE.—Articles of incorporation have been filed for the Portland & Oregon City Railway Company with a capital stock of $200,000, by T. C. Fletcher, B. E. Fletcher and Francis Vandermeer. The company plans to build an electric railway to extend between Portland and this city.

OLYMPIA, WASH.—The Kelso & Eastern Railroad Company has been incorporated with capital stock of $500,000, to operate an electric or steam railroad from Kelso eastward toward Mayfield. The incorporators are John L. Harris, J. M. Ayres, G. L. Buland, F. L. Stewart and F. M. Broadbent.

TOPEKA, KANS.—It is said that a new proposal providing for the construction of an interurban line from Topeka to Dover via Gage Park has been prepared for submission to the City Council by the Topeka & Southwestern Railway Company. The proposition asks that the city of Topeka vote $100,000 bonds for the construction of the line.

TULARE, CAL.—Officials of the Big Four Railway Company have applied to the State Railway Commission for permission to increase the company's capital stock from $500,000 to $5,000,000. It is understood that it is the plan to increase the proposed mileage of the electric line to include a branch from Visalia, through Han-

ford, Dinuba and East Side towns to connect with Fresno. T.

JENKINS, KY.—An electric railway line eight miles in length, connecting the industrial towns of McRoberts, Jenkins, Dunham and Burdine, Ky., is to be built by the Consolidation Coal Company, operating a large number of mines around those towns in Eastern Kentucky, according to reports from that vicinity. It is said that the line is proposed in order to afford rapid communication facilities between the company's various properties. Power will be furnished from the company's plant at Jenkins. G.

SAN DIEGO, CAL.—One of the most elaborate electric railway propositions ever suggested in this section is that made to the Chamber of Commerce of this city by W. F. Burnet, of Watsonville, for the construction of an electric railway by the San Diego, Escondido and El Centro Traction Company from this city to Escondido, thence by Valley Center to the top of Palomar Mountain, at Nellie, a summer resort; thence down the east side of the mountain to Warner Hot Springs and through the San Felipe Pass to and across the desert to El Centro; in Imperial Valley. The company will be capitalized at $5,000-000. T.

OLYMPIA SPRINGS, KY.—The Olympian Springs Hotel Company recently organized by Louisville, Ky., capitalists to take over the Olympian Springs, Ky., hotel and surrounding property, has decided to build a three-mile electric railway line, to be operated from the company's proposed new power plant, to connect the property with the Chesapeake & Ohio Railway, three miles distant. For this purpose the Olympian Springs Railway Company will be incorporated to build and operate the road. Until the road is placed in operation the company will handle its guests by means of motor buses. The plans of the company include the erection of a power house adequate to furnish power and lights for the proposed line and for all other purposes in connection with the property. Fred B. Shireman, of Louisville, has been elected president of the company. G.

NEW INCORPORATIONS.

DOVER, DEL.—The Electric Specialty Company, of Baltimore, Md., has been incorporated under the State Laws of Delaware, to the extent of $10,000. N.

SALT LAKE CITY, UTAH.—The Hoppie Electrical Company has been incorporated with a capital stock of $50,000. Curtis Hawley is president.

GREEN LAKE, WIS.—Green Lake Electric Products Company has been incorporated with a capital stock of $10,000 by L. Pynch, T. R. Devail and J. R. Stewart.

GRAND RAPIDS, MICH.—Union Electric Products Company has been incorporated with a capital stock of $25,000 for the purpose of manufacturing electric utensils.

REEDSBURG, WIS.—The Reedsburg Electric Company has been incorporated with a capital stock of $10,-000 by James R. Semple, James A. Stone and Anna L. Semple.

BUFFALO, N. Y.—Neubeck Electro-Plating Company, Incorporated, has been granted articles of incorporation with a capital stock of $10,000. The incorporators are James Franklin, George S. Shea and Percy S. Lansdowne, all of Buffalo.

FOREIGN TRADE OPPORTUNITIES.

(Parties interested in the following items should address the Bureau of Foreign and Domestic Commerce, Washington, D. C., and refer to the file number noted.)

No. 11,319.—TELEPHONE SYSTEM.—A report from an American consular officer in Asia states that owing to the present unsatisfactory telephone service in a large city an officer requested to be placed in touch with an American company that would be prepared to install a modern telephone system.

No. 11,307.—ELECTRIC POWER PLANT.—An American consular officer in the Far East has been advised that a mining concern will shortly require a 2,000 or 2,500-kilowatt electric power plant. The engineers who will technically decide upon the electrical apparatus to be purchased are favorable to American products.

No. 11,287.—ELECTRIC-LIGHT SUPPLIES AND TELEPHONES.—An American consul in Central America has transmitted the name of a person in his district who is interested in elcctric-light supplies and telephones and who has been requested to figure on an electric-light outfit for two towns.

No. 11,292.—WIRELESS TELEGRAPHY APPARATUS.—A report from an American consul in England states that a firm in his district desires particulars, including illustrations, prices, etc., from American manufacturers of wireless telegraphy apparatus. The firm is in touch with several ship and trawler owners who own at least 550 vessels.

No. 11,298.—TURBOGENERATOR—Proposals will be received for supplying, delivering, and placing one 2,-000-kilowatt high-pressure steam turbine, coupled direct to one extra high-tension alternating-current generator, together with barometric condenser, pumps, etc., for the Oldham (England) Corporation Electricity Committee. Copies of specifications, etc., can be obtained from Mr. S. Wilmott Newington, Greenhill Electricity Offices, Oldham, England, on payment of $10.22, which will be returned on receipt of a bona fide tender.

No. 11,323.—SWITCHBOARDS AND TELEPHONE PARTS.—Tenders will be received at the office of the Deputy Postmaster General, Melbourne, Australia, up to September 16 for supplying (1) an automatic or semi-automatic switchboard and parts (Schedule 859), and (2) a common-battery multiple switchboard (Schedule 860). Tenders will also be received at the Office of the Deputy Postmaster General, Adelaide, until August 13 for supplying (1) telephone parts (Schedule 292), and (2) 26 common battery switchboards (Schedule 293). Copies of specifications and forms of tender may be obtained upon application to the High Commissioner for the Commonwealth of Australia, 72 Victoria Street, London, England.

FINANCIAL NOTES.

Chicago Railways Company's July earnings increased eight per cent compared with a June increase of nine per cent and an increase of about ten per cent for the year to date.

It is stated that the United Light & Power Company has completed arrangements whereby the interest on the $1,618,000 of three-year six-per-cent notes of the company which was defaulted June 1, 1913, will be paid before the expiration of the ninety days of grace named in the indenture. Although no date has been set for the payment it is reported that it will be August 1.

The Middle West Utilities Company will sell publicly $2,000,000 three-year six-per-cent collateral notes of an authorized issue of $3,500,000, to complete payment on property heretofore contracted for and to provide funds for development of subsidiary companies and to fund its floating debt.

Contrary to precedent the sales and earnings of the Westinghouse Electric & Mannufacturing Company thus far this summer have proven almost record-breaking. June gross earnings were practically $4,000,000, counting the earnings of the lamp company, and were the largest of any month in the company's history, being at an annual rate of about $48,000,000. Net earnings of the Westinghouse Company inclusive of the net of the Sprague and Perkins companies were in the neighborhood of $500,000, or at the annual rate of about $6,000,000. Last year the Westinghouse Company earned but $3,945,000 net. For the last three months of the company's current fiscal year the net earnings were over $1,000,000, which also established a record for the first quarter, This figure is about twice that of the first quarter of last year.

At the annual meeting of the Hudson & Manhattan Railroad Company, G. W. Davison, vice-president Central Trust Company; J. J. Hanauer, Kuhn, Loeb & Company; A. J. Hemphill, president, Guaranty Trust Company; J. W. Platten, president U. S. Mortgage & Trust Company, and W. H. Williams, vice-president Delaware & Hudson Company, were elected directors to succeed the following: Secretary of the Treasury McAdoo, who resigned from the Hudson & Manhattan upon his appointment to the cabinet; Senator Frank O. Briggs of New Jersey, deceased; and William M. Barnum, Frederic B. Jennings and John G. McCullogh, who resigned. The balance of the board consists of Lewis L. Clarke, Pliny Fisk, Wilbur C. Fisk, Judge E. H. Gary, R. W. Meirs and W. G. Oakman In accordance with the plan of readjustment of the company's finances which was declared operative recently, all the company's preferred and common stock which has assented to the plan, amounting to about 95.5 per cent, will be placed under a voting trust agreement, which will last for at least five years. The voting trustees will be: Charles F. Adams, treasurer of Harvard University; Felix M. Warburg, of Kuhn, Loeb & Company, and Albert H. Wiggin, president of the Chase bank.

The stockholders of the Barcelona Traction, Light & Power Company, Limited, have authorized the creation of $12,500,000 7-per-cent non-cumulative preferred stock. Of this amount $10,000,000 will be issued, and it has already been sold to a French syndicate at par. The proceeds will be used for further developing the plans of the company in and around Barcelona, Spain. The remaining $2,500,000 of the new preferred stock will be held in the company's treasury against further needs. Dr. F. S. Pearson is president of this company, which was organized something like two years ago to construct and operate a tramway property in and around Barcelona and also to develop and distribute electric light and power. The Barcelona company also has $30,000,000 common stock, all of which has been issued. It is pushing rapidly its hydroelectric installations, and the work is proceeding at a satisfactory rate. Some 10,000 men are employed at the present time. The company controls all of the tramway lines and electric light and power properties in Barcelona.

Dividends.

American Railways Company: 1.75 per cent on preferred, payable August 15 to stock of record July 30.

Binghamton Light, Heat & Power Company; regular quarterly dividend of 1.5 per cent on preferred and 0.75 per cent on common, payable July 15 to stock of record July 1.

Blackstone Valley Gas & Electric Company, of Pawtucket and Woonsocket; the regular quarterly dividend of $2 a share on its common stock, payable September 2 to stock of record of August 16.

Brazilian Traction Light & Power Company, Limited; regular quarterly dividend of 1.5 per cent, payable August 20 to stock of record July 31.

Cities Service Company; the regular monthly dividends of 0.5 per cent on its preferred stock, and five-twelfths of one per cent on its common stock, both payable August 1 to stock of record July 15.

Cumberland County Power & Light Company, of Portland, Me.; regular quarterly dividend of 1.5 per cent on preferred, payable August 1.

Federal Sign System; regular quarterly dividend of 1.75 per cent, payable August 1 to stock of record July 25.

Fort Worth Power & Light Company; regular quarterly dividend of 1.75 per cent on preferred, payable August 1, to stock of record July 22.

Grand Rapids Railways; 1.25 per cent on preferred, payable August 1 to stock of record July 15.

Illuminating and Power Securities Corporation; regular quarterly of 1.75 per cent on preferred, payable August 15 to stock of record July 31.

Kellogg Switchboard & Supply Company; regular quarterly dividend of three per cent, payable August 2 to stock of record July 31.

Manhattan Electrical Supply Company; regular semi-annual of three per cent on preferred and three per cent on the common, payable August 4 to stock of record of July 15.

North American Company; the regular dividend of 1.25 per cent, payable October 1 to stock of record on September 15.

Pacific Power & Light Company; regular quarterly dividend of 1.75 per cent on preferred, payable August 1.

Railways Company General; regular quarterly dividend of 1.75 per cent, payable August 1 to stock of record July 21.

Sayre Electric Company; regular quarterly of 1.5 per cent on preferred and one per cent on common, payable July 15 to stock of record of July 1.

Union Pacific Power & Light Company; regular quarterly dividend of 1.75 per cent on preferred, payable August 1 to stock of record July 23.

York Railways Company; a semi-annual preferred dividend of 2.5 per cent, payable July 31, to stock of record of July 21.

Reports of Earnings.

DETROIT EDISON.

The Detroit Edison Company reports to the New York Stock Exchange, for the twelve months ended May 31, 1913, as follows:

Gross	$4,859,699
Net, after taxes	2,076,617
Surplus after charges	1,271,463
Reserves, depreciation, etc	583,357
Dividends	611,467
Balance	176,639
Premiums received on sale of capital stock	5,755
Previous surplus	610,854
Profit and loss surplus	793,248

CITIES SERVICE COMPANY.

The Cities Service Company reports earnings for June, and the twelve months ended June 30, 1913, as follows:

	1913	1912
Gross	$1,441,560	$1,098,177
Net after expenses	1,364,299	1,023,436
Surplus after dividends	366,464	274,556
June gross	115,444	79,540
Net after expenses	103,657	74,279
Surplus after dividends	6,560	5,000

Total accumulated surplus of the company to June 30, 1913, was $831,819.

WESTERN UNION TELEGRAPH COMPANY.

The Western Union Telegraph Company reports as follows for the months ending May 31:

	1912.	1913.
Gross Earnings	$36,986,813.58	$41,562,075.48
Operating expenses, including rent of leased lines	$26,113,616.02	$30,808,463.27
Current maintenance	3,045,415.38	3,259,565.15
Reserved for depreciation and Reconstruction	1,832,264.16	3,375,033.32
*Reserved for taxes	617,649.06	922,500.00
Total expenses	$31,608,944.62	$38,365,561.74
Balance	$ 5,377,868.96	$ 3,196,513.74
Add: Income from loans and investments, including rentals from real estate	1,183,999.70	892,122.61
Net earnings	$ 6,561,868.66	$ 4,088,636.35
Deduct: Interest on bonded debt	1,558,985.18	1,225,793.36
Net profits, after allowing for interest	$ 5,002,883.48	$ 2,862,842.99
Less eleven months' proportion of dividends	2,742,487.50	2,742,811.25
Balance carried to surplus	$ 2,260,395.98	$ 120,031.74

*Reserve in this period of 1912 reduced on account of over-reserve in previous months.

AMERICAN TELEPHONE.

The report of the American Telephone & Telegraph Company for the six months ended June 30, 1912, shows net earnings of $20,255,853, against $18,062,202 for the corresponding period last year. The income account for the half year compares as follows:

	1913	1912
Gross	$22,731,941	$20,327,705
Operating expenses	2,476,088	2,265,502
Net	$20,255,853	$18,062,202
Charges	3,790,037	2,761,119
Balance	$16,465,816	$15,301,083
Dividends paid	13,671,065	12,635,719
Surplus	$ 2,794,750	$ 2,665,365

UTAH POWER & LIGHT.

Utah Power & Light Company, and its operating subsidiaries report earnings for June, 1913 and the 12 months ended June 30, 1913, as follows:

	1913	1912
June gross	$ 144,070	$ 116,857
Net after taxes	93,222	56,412
Twelve months gross	1,543,212	1,478,223
Net after taxes	875,091	814,124

Earnings of all operating companies, now operated or controlled are shown for the comparative periods, irrespective of the dates of their acquisition.

KENTUCKY TRACTION & TERMINAL.

The combined earnings of the Kentucky Traction & Terminal Company and the Lexington Utilities Company, for May, 1913, and the twelve months ended May 31, 1913, were as follows:

	1913	1912
May gross	$ 64,836	$ 58,950
Net after taxes	35,000	25,003
Surplus after charges	15,794	7,725
Twelve months gross	737,350	689,673
Net after taxes	358,604	293,539
Surplus after charges	138,646	84,872

CUMBERLAND COUNTY POWER.

	1913	1912
May gross	$ 175,866	$ 166,126
Net after taxes	75,365	69,588
Surplus after charges	18,072	16,749
Twelve months gross	2,199,570	2,067,554
Net after taxes	975,996	800,388
Surplus after charges	305,781	204,508

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	July 21	July 14
American Tel. & Tel. (New York)	127½	126¾
Commonwealth Edison (Chicago)	*128	*128
Edison Electric Illuminating (Boston)	*275	275
Electric Storage Battery common (Philadelphia)	45	45
Electric Storage Battery preferred (Philadelphia)	45	45
General Electric (New York)	139	138
Kings County Electric (New York)	129	129
Manhattan Transit (New York)	1⅝	1⅝
Massachusetts Electric common (Boston)	14½	13½
Massachusetts Electric preferred (Boston)	70½	69½
National Carbon common (Chicago)	*113	*113
National Carbon preferred (Chicago)	*111	*111
New England Telephone (Boston)	140	139¾
Philadelphia Electric (Philadelphia)	22	21¾
Postal Telegraph and Cables common (New York)	76	76
Postal Telegraph and Cables preferred (New York)	65	65
Western Union (New York)	62	61
Westinghouse common (New York)	59½	56
Westinghouse preferred (New York)	106	104

*Last price quoted.

PERSONAL MENTION.

LOUIS STRENG, who formerly headed the engineering department of the Kentucky Electric Company, Louisville, Ky., will be retained as a member of its staff as consulting engineer.

H. E. BRANDLI has been made manager of the properties of the Citizens Gas, Electric & Heating Company at Mt. Vernon, Ill., succeeding C. B. Severson, transferred to New York as purchasing agent for the Doherty company.

A. CLIFFORD, formerly manager of the Star Electric Company, Decatur, Ill., has opened an office at 652 Wait Building, Decatur, as a manufacturers' agent. Mr. Clifford is anxious to get in touch with manufacturers not represented in Illinois.

HENRY BLANCK, engineer in charge of the Imperial Railways of Berlin, is touring in this country, studying American methods of transportation. Mr. Blanck spent some time in Philadelphia a week ago, looking over the local street traffic conditions, and was also the guest of President Rea of the Pennsylvania Railroad.

C. M. WELCH, formerly manager of the transformer department of the Duncan Electric Manufacturing Company, Lafayette, Ind., has recently become associated with the Moloney Electric Company, St. Louis, Mo., at its main office. Mr. Welch has been particularly active in the development of sign lamp transformers, and is a pioneer in the design of this apparatus. In his new duties the design and sale of large transformers and special applications of transformers will receive the major part of his time.

A. T. MACDONALD, who made an excellent record during his connection with the Louisville Lighting Company in the new business department, his records showing a steady increase in business, has been placed in charge of the special committee of Louisville business men who are arranging the details of an exposition of Louisville-made products which is to be held during the latter part of August. Mr. Macdonald is one of the best known and best liked men in Louisville, his long experience in newspaper and Commercial Club work, as well as with the lighting company, bringing him into intimate contact with all of the active business men in the city. Arrangements for the display of Louisville factory products in the store windows in the busy down-town section of the city are going forward nicely, and the exposition bids fair to be a tremendous success.

OBITUARY.

JOHN J. LANE, secretary of the New England Street Railway Club from 1904 to 1912, died at his home in Reading, Mass., July 13, after a protracted illness. Mr. Lane was born in Candia, N. H., in 1860. During his early life he was engaged in country newspaper work in his native state, later becoming connected with newspapers in Manchester and Laconia, N. H. He went to Boston in 1896 to accept a position with the Associated Press. During his service as secretary of the Street Railway Club he was editor of the *Street Railway Bulletin*.

ANTHONY N. BRADY, dispatches from London, England, announce, died at the Carlton Hotel, London, at 8:30 o'clock on July 22. Mr. Brady was born at Lille, France, August 22, 1843. He came to the United States with his parents when a child. He was in business in Albany, N. Y., for a number of years, and his first entrance into railway, finance and development was in the rebuilding of the "Huckleberry" railway system in New York. Shortly after he became interested in the purchase of gas plants at Albany, Troy and Chicago, and in street car lines at Albany and Troy. He also became the owner of large granite quarries. He planned the consolidation of the New York surface lines and promoted similar consolidations in Washington, Philadelphia and other cities. Until quite recently he was president of the New York Edison Company, being succeeded by his son, Nicholas F. Brady. He was also interested as a director or officer in the United Electric Light & Power Company, Baltimore; Edison Electric Illuminating Company, Brooklyn; Municipal Gas Company, Albany; Memphis Consolidated Gas & Electric Company, Kings County Electric Light & Power Company, Brooklyn; Utica Gas & Electric Company, Brooklyn Heights Railway Company, Brooklyn Rapid Transit Company, Brooklyn-Queens County & Suburban Railway Company, Brooklyn Union Elevated Railroad Company, and about 40 other corporations.

PROPOSALS.

MOTOR GENERATOR.—Bids will be received by M. Peterson, secretary, Winnipeg, Man., until August 9 for the manufacture, delivery and erection on foundation supplied by city, of one 1,000-kilowatt motor generator.

FLAMING-ARC RECTIFIER SETS.—On July 30 bids will be received by the Board of Electric Lighting, Jamestown, N. Y., for furnishing one and two 75-lamp series luminous or flaming-arc rectifier sets and also 75 and 150-series luminous or flaming-arc lamps, in accordance with specifications on file in the office of the board. Address clerk of the Board of Electric Lighting Commissioners.

ELECTRIC CONDUIT AND WIRING AND INTERIOR LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until August 22 for the electric conduit and wiring and interior lighting fixtures of a one-story building for the post office at Marshall, Tex.; until August 25 of a one-story building for the post office at Lebanon, Tenn.; until August 28 of a one-story building for the post office at Shelbyville, Tenn.; and until September 1 of a one-story building for the post office at Owatonna, Minn., in accordance with drawings and specifications, copies of which may be obtained from the custodians of the sites or from the office of the Supervising Architect.

NEW PUBLICATION.

ON TELEPHONE DUTY.—"On Telephone Duty" is one of the most interesting publications which we have had the opportunity of reviewing in a long time. It tells a lot of true stories of the intelligence and heroism of the girl at the switchboard. The best telephone service demands human intelligence at the switchboard. The Bell telephone operator is frequently called upon to act quickly in an emergency. The situation frequently calls for coolness and courage. Circumstances arise which call for self-reliance and initiative upon the part of the operator, occasions when prompt and intelligent action is demanded. The American Telephone & Telegraph Company, comprising the Bell system and associated companies, has published under the above title a number of instances gleaned from the columns of the daily press and from other sources, showing records of the unselfish devotion or splendid courage and the keen intelligence of the loyal and devoted army of Bell telephone workers.

DATES AHEAD.

California State Association of Electrical Contractors. Fourth annual convention, Santa Barbara, Cal., August 13-16.

Michigan Section National Electric Light Assocation. Annual convention, Ottawa Beach, Mich., August 19-21.

International Association of Municipal Electricians. Annual meeting, Watertown, N. Y., August 19-22.

Old-Time Telegraphers and Historical Association and Society of the United States Military Telegraph Corps. Annual reunion, Detroit, Mich., August 26-28.

National Electrical Supply Jobbers' Association. Fall meeting, Clifton Hotel, Niagara Falls, Canada, September 8-10.

Association of Edison Illuminating Companies. Annual convention, Cooperstown, N. Y., September 8-11.

American Electrochemical Society. Semi-annual meeting, Denver, Colo., September 9-11.

American Institute of Electrical Engineers. Pacific Coast Convention, Vancouver, B. C., September 9-11.

Northwest Electric Light and Power Association. Annual convention, Seattle, Wash., September 10-12.

Pennsylvania Section, National Electric Light Association. Annual convention, Delaware Water Gap, Pa., September 16-18.

New England Section of the National Electric Light Association. Annual convention, Hotel Vermont, Burlington, Vt., September 17-19.

Illuminating Engineering Society. Annual convention, Pittsburgh, Pa., September 22-26.

Association of Iron and Steel Electrical Engineers. Annual meeting, New York, N. Y., September 22-27.

Colorado Electrical and Industrial Exposition, Auditorium, Denver, Colo., October 4-11.

Colorado Electric Light, Power & Railway Association. Eleventh annual convention, Denver, Colo., October 6.

Jovian Order. Annual convention, Hotel Astor, New York, N. Y., October 14-16.

Electrical Exposition and Motor Show of 1913. New Grand Central Palace, New York, N. Y., October 15-25.

Telephone Pioneers of America. Annual meeting, Chicago, Ill., October 16-17.

Association of Railway Electrical Engineers. Annual convention, Hotel La Salle, Chicago, Ill., October 18-24.

Electric Vehicle Association of America. Annual convention, Hotel La Salle, Chicago, Ill., October 27-28.

With the Electrical Manufacturers

Bridgeport Brass Company, Bridgeport, Conn., has sent out folders showing an installation of catenary overhead line in which Phono-electric trolley wire was used.

The Bryant Electric Company and the **Perkins Electric Switch Manufacturing Company,** Bridgeport, Conn., announce the opening of a New York sales office in the Vanderbilt Avenue Building, 51 East Forty-second Street.

Clapp Eastham Company, 139 Main Street, Cambridge, Mass., has issued catalog P, which lists and briefly describes various motors, dynamos, engines, batteries, their parts and materials, also electrical instruments for the experimenter.

Delta-Star Electric Company, Chicago, Ill., is distributing a copyrighted bulletin descriptive of its S. & C. carbon-tetrachloride fuses for all voltages up to 110,000 volts. Numerous illustrations showing actual installations in commercial operation are given.

Oshkosh Manufacturing Company, Oshkosh, Wis., announces that owing to constantly increasing business and lack of space in the old quarters, the company has found it necessary to remove its Chicago office, in charge of R. L. Thayer, from 424 South Clinton Street to 419 South Clinton Street.

Diehl Manufacturing Company, Elizabeth, N. J., has published in the form of a small folder a description of an automatically regulated motor-driven blower which it furnished for automatic draft regulation in a forced-draft boiler plant; this installation resulted in a saving for the first year of about $2,000.

Atlantic Insulated Wire & Cable Company, Stamford, Conn., has ready for distribution complete price lists relative to Neptune and Triton insulated wire. The Neptune brand represents extra high grade insulation and the Triton brand represents high grade intermediate insulation. These catalogs will be furnished to those interested upon request.

The Adapti Manufacturing Company, Cleveland, O., has prepared some very interesting literature relating to its conduit fittings. This includes a complete catalog of Adaptibox fittings, with illustrations, descriptive information, sizes and prices. The catalog is in the form of a data book of pocket edition size, and either or both may be secured upon request.

The Goulds Manufacturing Company, Seneca Falls, N. Y., has issued a booklet emphasizing Goulds quality in pump specifications. This little publication is illustrated with a number of views of important engineering projects in which Gould pumps are extensively used. There are also shown a large number of Goulds pumps of various types, many of which are motor-driven.

Eugene Dietzgen Company, Chicago, has issued a number of leaflets relating to various supplies for draftsmen and engineers. Among these are circulars relating to the steel erasing shield, combined ink-bottle holder and paper weight, Dietzgen new liquid drawing ink, Multiplex slide rule, combination triangle and protractor, Simplicity drawing stand, contractor's and architect's levels, etc.

Mechanical Appliance Company, Milwaukee, Wis., has secured a contract for 24 motors to be installed in the factory of the F. Mayer Boot & Shoe Company in that city. There will be 5 two-horsepower and 19 three-horsepower Watson slow-speed direct-current 220-volt motors running at 420 revolutions per minute. The slow-speed motor was chosen so that the motors could be coupled directly to the shaft driving the sewing machines.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has received an order from the Toledo Railway & Light Company, Toledo, O., for one 1,500-kilovolt-ampere frequency-changer set consisting of a three-phase, 60-cycle, 4,400-volt generator and a three-phase, 25-cycle, 4,000-volt synchronous motor. The generator has a 27.5-kilowatt compound-wound, 125-volt exciter, and the motor has a 35-kilowatt exciter of similar characteristics. A two-panel switchboard for the control of this set is also included.

M. B. Austin & Company, Chicago, has placed in very desirable form a complete listing of the materials of construction and electrical apparatus comprising the "Austin Line." There is ready for distribution a complete set of revised bulletins, cancelling all previous bulletins and all list prices in catalogs or printed matter. These bulletins will be kept correct and up to date, and bulletin covers will be furnished those desiring to maintain a complete record of Austin material. The sheets now available run from No. 1 to No. 68, inclusive.

Automatic Electric Company, Chicago, Ill., manufacturer of automatic telephone equipment, has opened an office in the First National Bank Building, Pittsburgh, Pa., for the purpose of pushing its intercommunicating telephone system in Pittsburgh and vicinity. This new office will temporarily be in charge of Elsworth Keith, supply sales manager of the company. In addition to the Pittsburgh office the Automatic Electric Company now has branch offices in New York City and Toledo, O., and later expects to open offices in all the large cities.

The Hart Manufacturing Company, Hartford, Conn., has issued catalog E. This publication covers 46 pages and is devoted chiefly to descriptions and illustrations of "Diamond H" push-button switches, rotary flush and rotary surface switches, remote-control switches, automatic door switches, flush receptacles, steel wall cases, etc. This catalog is somewhat out of the ordinary in the thoroughness with which these various types of switches are illustrated, thus making various parts of their construction clear; a considerable number of wiring diagrams are also included. Full data are given in connection with each type of switch and wall box referred to.

American Krupp System-Diesel Engine Company has been incorporated under the laws of Delaware to manufacture and sell Krupp-Diesel engines. The company has secured exclusive rights in this country to all inventions, patents, etc., of the famous German Krupp firm relating to oil engines and particularly Diesel engines. The company will manufacture and deal in stationary, portable and marine engines. One of its particular aims is to displace the gasoline engine with the Krupp-Diesel engine, and it claims that the fuel cost after such change will be only a fraction of what it is when gasoline is used as a fuel, because the Diesel engine uses fuel oil costing only about one-fifth as much as gasoline.

The Brookfield Glass Company, 2 Rector Street, New York, has issued a folder showing several new types of insulators which should attract the attention of everyone interested in this material. The folder illustrates altogether 43 designs of glass insulators manufactured by the Brookfield Glass Company, and including the several new designs it makes a very complete presentation of requirements for insulating material of this character. In addition to the illustrations which show the cross-section and essential dimensions, the average weight, the diameter of the groove, the number per barrel and the approximate weight per 1,000, packed, are all given for the various sizes and types. This folder will be sent to those interested upon request.

C & C Electric & Manufacturing Company, Garwood, N. J., has issued Bulletin 513C, which is a 28-page publication devoted to electric arc-welding apparatus. This gives a complete description of the company's new multiple-unit arc-welding outfit, by means of which several operators can work from the same motor-generator set and use either graphite or metallic electrodes for various kinds of welding operations by means of the electric arc. Over 30 illustrations are given showing interesting jobs that were welded with the C & C outfit. Curves are also included showing the efficiency of these sets and the cost of operating them as compared with other forms of electric welding. Copies can be had by addressing the company at Garwood.

The Bristol Company, Waterbury,

Conn., has issued a number of new bulletins devoted to various types of its recording thermometers. Bulletin 175 describes electric resistance thermometers designated as model 162; these are equipped with Weston millivoltmeter movements and are operated on direct current. Bulletin 176 is devoted to Bristol electric pyrometers; these operate on the thermocouple principle and are of several types, some being combination indicating and recording instruments and others being of the indicating and recording type. Bulletin No. 178 describes Bristol wet and dry-bulb recording thermometers; these are designed particularly for use in dry rooms and dry kilns and compute the degree of humidity or percentage of moisture in the atmosphere, whether it be outdoors or indoors.

The Luminous Unit Company, St. Louis, Mo., has issued an attractive pamphlet showing some 30 designs of its Brascolite luminous unit. This lighting fixture, it will be recalled from a description which appeared in these columns some months ago, is a modified form of semi-indirect equipment. In some types of these fixtures the design has been modified so as to place the diffusing globe directly against the reflecting plate. Of the designs shown in the pamphlet a large number are of very artistic pattern. The last page of the pamphlet gives the results of a test of these units conducted at Washington University, St. Louis, the results of which were highly gratifying to the Brascolite unit compared with direct lighting equipment using identically the same lamp and mounting height. The company has also prepared a small folder calling attention to its new Handilite; this is an adjustable and portable lamp that can be used in a variety of ways, as a desk or table lamp, as a piano lamp, as a shaving or dressing-table lamp, etc.

Record of Electrical Patents.

Issued by the United States Patent Office, July 15, 1913.

1,067,235. Winding Machine. W. J. Barrett, assignor to Western Electric Co. Automatic machine for winding coils of several layers.

1,067,240. Coal-Leveling Machine. P. H. Douglas, assignor to Wellman-Seaver-Morgan Co., Cleveland, O. Has two motors for operating various parts of the machine.

1,067,246. Wire-Clamp for Insulators. J. H. Hubbard, Iron River, Mich., assignor of one-half to H. A. Dusky. Has a yieldable can lever to clamp against the insulator.

1,067,248 to 1,067,252. Changeable Indicator. J. Hutchinson, Bensonhurst, N. Y., assignor to National Indicator Co. These five patents cover various features and modifications of changeable indicators to show the designation and time of departure or arrival of railroad trains; part of the mechanism is electrically controlled and operated.

1,067,256. Vehicle Battery-Box Construction. H. H. Kennedy, assignor to Waverly Co., Indianapolis, Ind. Removable hood over the box holding part of the storage battery of an electric vehicle.

1,067,264. Holder for Glowers. R. Neckerman and O. Foell, assignors to Nernst Lamp Co., Pittsburgh, Pa. The support is included in the glower circuit and adapted to maintain proper tension on the glower.

1,067,270. Induction Motor. K. A. Pauly, assignor to General Electric Co. The stator winding provides for changeable number of poles; the rotor winding provides for interconnection of successive phases and also has external resistance.

1,067,274. Telephone Register and Lock-Out Device. C. V. Richey, Washington, D. C., assignor to Phone Call Recorder Co. Combined substation meter and transmitter lock-out for party lines.

1,067,275. Igniter for Internal-Combustion Engines. M. P. Ryder, Springfield, Mass. Includes an eccentrically operated arm for the spark coil and means for advancing or retarding the spark.

1,067,287. Magnetic Separator. G. Ullrich, Magdeburg, Germany. Has a series of upper and lower horizontal poles between which the carrier rotates.

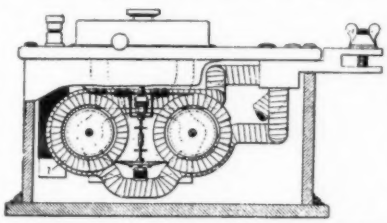
1,067,311. Wattmeter. F. Conrad, assignor to Westinghouse Electric & Mfg. Co. Comprises two potential coils mounted for rotation about an axis between them and two load coils adjacent to opposite sides of both potential coils. (See cut.)

1,067,317. Speed-Controller for Motor-Vehicles. J. Coplon, Buffalo, N. Y. The speedometer is electrically connected to the throttle so as to control same.

1,067,325. Electric Locomotive. G. M. Eaton, assignor to Westinghouse Electric & Mfg. Co. Relates to arrangement of trucks of which each half of locomotive has two.

1,067,331. Flush-Switch Mounting. M. Guett, assignor to Hart & Hegeman Mfg. Co., Hartford, Conn. Gang switches are held by U-shaped straps arranged side by side.

1,067,333. Insulating-Tube Machine. E. Haefely, assignor to Westinghouse Electric & Mfg. Co. Includes a heated cylinder and pressure piston.



1,067,311.—Arrangement of Wattmeter Coils.

1,067,354. Train Telephone-Connection Pole. W. Leach, Moose Jaw, Sask., Can. Fitting into a socket on top of a pole is a double connecting member adapted to engage two line wires.

1,067,372. Combined Printing, Washing, and Drying Machine. C. F. Pease, assignor to C. F. Pease Co., Chicago, Ill. A blue-printing machine with a number of arc lamps and a heating device consisting of rheostats electrically connected with the arc lamps, and means for causing the wet paper to travel adjacent the heating device.

1,067,391. Lighting Fixture. L. W. Young, New York, N. Y. Has a reflector directly above the lamp and a dished diffusing globe about and beneath the lamp.

1,067,407. Signaling Device for Locomotives. C. H. Cobb, Great Falls, Mont. Relates to a special connector (like a spring-jack) in the signaling circuit.

1,067,415. Soldering Body for Joining Electric Conduits or the Like. C. E. Egnér, Stockholm, Sweden. Comprises a flexible body of solder having a continuous flexible body of aluminum rigidly yet removably attached thereto.

1,067,433. Musical Instrument. W. P. DunLany, Cleveland, O., assignor of one-third to A. Tubman and one-third to T. H. Tubman. A musical horn with motor-driven fan geared to a reed-controlling disk. (See cut.)

1,067,437. Negative-Pole Plate for Storage Batteries. W. Morrison, Des Moines, Iowa. A pasted plate in which the grid is electrochemically formed to produce a bond between the active material and the grid.

1,067,452. Electric-Switch-Operating Mechanism. O. N. Wiswell, Snoqualmie, Wash. For throwing a three-pole high-tension outdoor switch.

1,067,454. Combined Magnet and Centrifugal Brake. G. F. Atwood, assignor to Western Electric Co. An armature is moved by centrifugal and magnetic action against a stationary annular electromagnet.

1,067,463. Magnetic Tachometer. A B. Cadman, Beloit, Wis., assignor to Stewart-Warner Speedometer Corporation. Includes a thermostat for affecting the rotating field according to temperature.

1,067,478. Welding Machine. J. H Gravell, assignor to Hale & Kilburn Co., Philadelphia, Pa. A resistance welder with specially adjustable tool and work supports.

1,067,482. Lamp-Socket. C. D. Meeker, East Orange, N. J. The key consists of a cylindrical communtator.

1,067,498. Fuse-Holder. H. W. Young, Chicago, Ill. A cartridge fuse with longitudinal opening in one side and a longitudinally moving cover plate.

1,067,527. Signaling System. C. A. Larson, assignor to Kellogg Switchboard & Supply Co., Chicago, Ill. A telephone-switchboard master key with special pole-changer ringing contacts.

1,067,544. Switch-Yard for Gravity Systems. R. Pfeil, assignor to Siemens & Halske A. G., Berlin, Germany. Selected siding switches are electrically operated step by step by the car during its progress toward the siding to be closed.

1,067,554. Lamp-Cord Adjuster and the Like. J. Sachs, assignor to Sachs Laboratories, Hartford, Conn. Consists of upper and lower members each provided with a direct and a return channel through which the cord passes. (See cut.)

1,067,561. Telephone-Receiver Casing. L. Swanson, New York, N. Y. Comprises a tubular rigid shell provided with perforations arranged in rows for holding insulation.

1,067,562. Electric Pump-Governor. W. V. Turner, assignor to Westinghouse Air Brake Co., Pittsburgh, Pa. A spring and air-pressure controlled plunger operates a circuit-closer.

1,067,566. Electromagnetic Device for Operating Typewriters. G. A. Wikander, Portland, Oreg. The magnet is energized only momentarily.

1,067,568. Electrical Fuse. H. W. Young, Chicago, Ill. The fuse element has zigzag terminals fitting into special sockets.

1,067,573. End-Cell Switch. J. W. Achard, Philadelphia, Pa. Consists of a screw, rows of contacts and contact rails parallel thereto and disposed in pairs on opposite sides thereof, a nut on the screw and brushes moved by the nut.

1,067,580. Electric Controller. A. E. Berdon, La Fayette, Ind. A regulator with permanent magnet and pressure coils associated with generator, storage battery and lighting circuits.

1,067,599. Combination Electric-Lamp Bulb and Diffuser. E. L. Frenot, assignor to Société La Mondaine, Paris, France. Has a diffusing globe mounted on a separable base surrounding the lamp base.

1,067,606. Telephone System. M. E. Grönvigh, Bergen, Norway, assignor of one-half to T. S. Pukerud. A special cable system for connecting the telephones in large buildings with central.

1,067,620. Commutator - Brush for Electric Generators and Motors. P. P. Nungesser, assignor to Nungesser Electric Battery Co., Cleveland, O. For connecting a stranded conductor to a carbon brush.

1,067,625. Storage-Battery Truck. B. M. Smith, Cleveland, O. For raising, lowering and transporting battery tanks.

1,067,627. Automatic Temperature-Regulator. B. F. Teal, Glenside, Pa.; E. R. Teal, executrix of said B. F. Teal, deceased. Electrically controlled.

1,067,629. Telegraph Display-Signal. F. W. Wood, assignor to Charles Cory & Son, New York, N. Y. A receiver and a transmitter move in synchronism, the receiver including a motor with a number of pole pieces, and the transmitter comprising a contact drum constructed to select and energize any of the pole pieces.

1,067,630. Car-Axle Lighting System. J. L. Woodbridge, Philadelphia, Pa. Includes a generator, storage battery and special regulators.

1,067,631. System of Electrical Distribution. J. L. Woodbridge, Philadelphia, Pa. Includes a constant-voltage generator supplying a lighting circuit and capable of charging two storage batteries through a resistance in series with each; the batteries are connected in series when supplying the lighting circuits on discharge.

1,067,635. Typewriter Carriage-Return Mechanism. N. L. Anderson, Winston, N. C. Has a carriage-return motor.

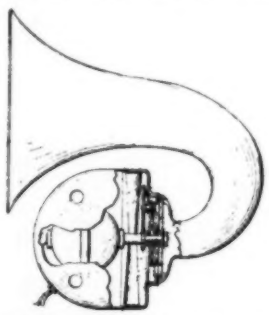
1,067,646. Searchlight for Umbrella Handles. A. J. Downey, Piqua, O. Contains a battery, lamp and reflector.

1,067,647. Electric Fluid-Heater. W. H. Fox, Minneapolis, Minn. A water-heater with heating elements in the inner chamber.

1,067,648. Electric Cartridge Fuse. G. W. Frazier, Portland, Oreg. Sectional plugs within the end caps hold the ends of the fuse element.

1,067,698. Method of Electrolytically Recovering Nickel. H. L. Wells and T. C. King, East Orange, N. J.; said wells assignor to said King; M. H. King, executrix of said King, deceased. Consists in treating finely divided matte with hydrochloric acid and then subjecting the solution to an electric current.

1,067,702. Terminal Lug. H. J. Wiegand, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Comprises a sheet-metal strip folded to form a

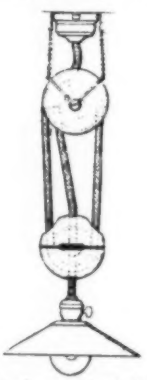


1,067,433.—Electric Musical Horn.

duplex main part with a lug to clamp onto an insulated conductor and a lug on each layer to clamp onto an exposed part of the conductor.

1,067,711. Multiple - Signal Transmitter. C. E. Beach, assignor to G. O. Knapp, New York, N. Y. A selective mechanism for causing any character wheel to operate the circuit-controller.

1,067,715. Telephony. S. G. Brown,



1,067,554.—Lamp-Cord Adjuster.

London, England. A high-inductance coil is put in the middle of each line wire and one part of a telephone relay is connected between centers of the coils and the other part across one coil.

1,067,718. Telephone Transmitter. J. Collins, Quaker City, O., assignor of one-half to W. K. Collins. Covers details of the electrode connections.

1,067,734. Crossing Signal. W. A. Hesse, Alameda, Cal. Electromagnetically controlled and motor-operated crossing gate with signal lanterns and alarm bell.

1,067,735. Electric Switch. E. M. Hewlett, assignor to General Electric Co. An oil switch in which the oil is put under pressure by the arc so as to extinguish same.

1,067,752. Electric Shade-Carrier. J. H. Ormrod and W. J. Purdue, Wellington, New Zealand. A two-part ring is screwed onto the lamp socket.

1,067,753. Leveling Instrument. O. Paré, Salem, Mass., assignor of one-tenth to A. R. Foisy. Includes an electric lamp to light up the spirit tubes.

1,067,772. Reading Apparatus. J. Steenson, Minneapolis, Minn. Includes an electric lamp in a case, a lens and manuscript rollers.

1,067,782. Dynamo-Electric Machine. A. B. Field, assignor to Allis-Chalmers Co., and Bullock Electric Mfg. Co. Relates to the rotor end-ring construction.

1,067,791. Spark Plug. C. H. Duffy, North Laurel, Md. Covers details.

Patents That Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office) that expired July 21, 1913.

564,182. Electric Igniter for Gas Engines. L. M. Bourgeois, Jr., New Orleans, La.

564,195. Electric Car-Brake. J. C. Henry, Colorado Springs, Colo.

564,196. Telephone. E. A. Hinckley, Owego, N. Y.

564,200. Alternating-Current Dynamo. M. Hutin and M. Leblanc, Paris, France.

564,243. Rail Bond for Electric Railways. F. H. Daniels, Worcester, Mass.

564,258. Electric Massage Apparatus. G. Rossbach, Lichtenfels, Germany.

564,262. Electrical Transportation System. P. K. Stern, St. Louis, Mo.

564,328. Telephone-Exchange System . W. W. Dean, St. Louis, Mo.

564,331. Electric Metal-Working Apparatus. H. Lemp, Lynn, Mass.

564,333 to 564,336. Means for Generating Electricity from Car-Wheel Axles. M. Moskowitz, Newark, N. J.

564,344. Electric Signal Apparatus for Elevators. S. C. Stickle, New York, N. Y.

564,369. Elevated Electric Railway. E. W. Farnham, La Grange, Ill.

564,371. Voice-Conveyor for Telephones. C. M. Fleury, Brooklyn, N. Y.

564,395. Electric-Car Trolley. W. H. Russell, Newcastle, Canada.

564,423. Process of Separating Ores. T. A. Edison, Llewellyn Park, N. J.

564,437. Electric Blasting-Machine. J. Macbeth, Brooklyn, N. Y.

564,453. Electric Metal-Working Apparatus. E. E. Ries, Baltimore, Md.

564,455. Electric Motor. G. J. Scott, Philadelphia, Pa.

564,456 and 564,457. Operator's Keyboard Apparatus and Circuit Therefor. C. E. Scribner, Chicago, and F. R. McBerty, Downer's Grove, Ill.

564,458. Keyboard Apparatus for Telephone-Switchboards. C. E. Scribner.

564,480. Electric Elevator. G. T. Francis, Chicago, Ill.

564,485. Electric Mat. O. H. Hicks, Chicago, Ill.

564,527. Conduit Outlet Box for Electric Wires. C. A. Metzger, Brooklyn, N. Y.

564,558. Speed-Regulator for Electric Motors. R. Eickemeyer, Yonkers, N. Y.

564,559. Dynamo-Electric Machine. R. Eickemeyer.

564,567. Thermostat. H. F. Maxim, Norfolk, Va.

Reissue 11,559. Electric-Arc Lighting. G. R. Lean, Cleveland, O.